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Economic Reconstruction in Yugoslavia

But a bold peasantry,
Their country's pride,
When once destroyed
Can never be supplied.
—Goldsmith, *The Deserted Village*.



WELL-GUARDED EARLAND

Economic Reconstruction in Yugoslavia

A PRACTICAL PLAN FOR THE BALKANS

George Radin



Published for THE CARNEGIE ENDOWMENT FOR
INTERNATIONAL PEACE

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To my friends, the members of
ZADRUGAS OF YUGOSLAVIA
with whom I worked for many years
to help bring about a better life
and more happiness
in the villages of the Nation

Preface

THOUGHTFUL people have long recognized that the basis of enduring peace lies less in the creation of systems of international police than in the assurance of fair conditions of livelihood for the common man, the elimination of exploitation both between nations and within nations. The day's work and the conditions for happy family life are the most important things to most people the world over. It is because of failure to achieve these homely but vital aims that people have turned to demagogues or have embraced theories of society which promise greater satisfaction than they find in the existing world. Therefore, any study based upon the realities of daily life, and offering hope of betterment by constructive measures which the people already understand and practice, is a contribution not only to the understanding of the country which it describes but also of methods which can be used elsewhere.

This book deals with Yugoslavia; but its descriptions and proposals are applicable elsewhere as well, especially in the Balkans and Eastern Europe, that part of the world which has suffered so much in the past from political and economic exploitation and which now confronts the new era with both hope and apprehension.

Yugoslavia has been chosen for this analysis because it is the pivotal state in the Balkans and the gateway to the East and to the West. It is fortunate that the people of Yugoslavia, left to their own resources for so long, were able to develop social and economic strength through the traditional coöperative practices, known as *Zadrugas*. The book therefore builds upon these coöperative associations which cover the entire territory, and foresees in their development the possibility of post-war economic and educational reconstruction. The *Zadrugas* constitute a way of life for the Serbian population, which numbered before the war some eight million, about half of the total population of Yugoslavia. The coöperative method, however, is by no means limited to the Serbians for it is well understood in other sections of the country and in other Eastern European countries as well. Its free coöperative ways can be

easily adopted by all, if given proper encouragement and support. The system therefore merits close study as a possible pattern in that part of the world in these days of sharp economic, social, and political diversities.

The record of the Serbian nation is that of a proud people, even in adversity, practicing democracy at home in ways which made a strong, free coöperative way of life seem natural to them. Coöperation in the *Zadrugas* is not only economic, it is also political in its implications, for it is a guarantee of personal liberty to the individual as well as of free social and economic institutions. Economically it stands for free enterprise, fitted to a social system which limits individual holdings of land so that no one person may accumulate more than he can reasonably operate with his family without outside hired help. Consequently, these small farms can be operated more scientifically through coöperatives than by the individual work of the owner. An old Serbian law guarantees the homestead—the dwelling house, a minimum amount of land and the means for its cultivation—forbidding its sale for any debt, and thus protecting the population against pauperism. The underlying idea of this legal provision originated in the Serbian code of 1345, known as Dushan's Code.

This Serbian pattern was destined to cover almost the whole of Yugoslavia before the Second World War. Big estates, such as existed in Austria-Hungary and throughout the Balkans under the Turks, came to an end in that part of Yugoslavia which it acquired at the close of the Balkan Wars in 1913 and at the end of the First World War in 1918. Dr. Charles A. Beard and the author of this volume report more fully on this important social and economic development in Yugoslavia after the First World War in their volume *The Balkan Pivot: Yugoslavia*, published by the Macmillan Company in 1929.

In view of this historical development among the people of Yugoslavia, it was but natural for the present government—as was the case with every administration in the past—to announce among its objectives the support of a Coöperative Movement in the country. Coöperatives in America and elsewhere view with great and continuing interest the outcome of the declaration of the present Government of Yugoslavia in favor of coöperatives. The immediate future will show whether the coöperative way of life of these people furnishes a practical golden middle way between capitalistic and communistic conceptions.

A translation of this volume into the Serbo-Croat language is now under way. It is hoped that it will reach the people whose institutions it describes, bringing to them suggestions of American experts on the management of rural industry and the need for development of both

power from the rivers of Yugoslavia in the economy of production and better roads by which to reach the markets of the world.

Mr. Radin, who has given years of devoted service to the cause of Serbian coöperatives, here brings rich results of his association with American authorities in agricultural economics. It is to be hoped that this service will now receive the due reward of serious consideration for the actual application of the proposals here advocated.

James T. Shotwell

April, 1946

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Introduction

THIS study represents an attempt to place before the people of Yugoslavia, and of other countries similarly situated, the best information available in the United States for use in post-war reconstruction, looking toward raising the standards and levels of living of the population. It consists of summaries of specific projects developed in the United States to show the steps that need to be taken in order to accomplish the best results in a given economy or social activity. Some of these projects are already being used through relief and rehabilitation activities in war-torn and devastated Yugoslavia. Inasmuch as three-quarters of the population live on the land and most of the others derive their livelihood indirectly from agriculture, the study deals almost exclusively with problems affecting agriculture and the rural population. To be sure, better living in Yugoslavia, as in all countries that are predominantly agricultural, depends upon the coördinate growth of industry, commerce and agriculture. This study covers only a small portion of what is needed for the post-war reconstruction and development of the country. It is but a beginning of what must be a continuing endeavor.

The work summarized in this volume is a sequence to relief and rehabilitation activities in Serbia in the First World War, which country was joined by the Croats and the Slovenes to form Yugoslavia. Foreign relief workers in Serbia were greatly impressed at that time by the keen desire of the people to help themselves, rather than to receive charity by way of relief from their Allies in World War I. Once their guns were silenced, the Serbian people directed their immediate attention to cultivating their land in order not to lose a single crop. They were, therefore, much more eager to acquire seeds, farm equipment and draft animals essential for the foundation of a lasting economy than to accept temporary relief. Their whole history bespeaks a humble, industrious, peace-loving and self-respecting people who never lived on a dole or by the exploitation of other people. Traditionally, they lived a coöperative way of life, coöperation being engraved in their very souls. Known as the *zadruga* way of life, described more fully in Chapter I, this coöperative pattern is a cradle of truly liberal democracy.

Although the spirit of the *zadruga* is one of the best expressions of humanity and Christianity, its body remained weak over the centuries. Geographically, the people live—from the sixth century—on—in the Balkan peninsula, at the gateway of the East and the West. Nature endowed these people with a rich soil, favorable climate, valuable mineral deposits and virgin forests of hard and soft woods. These riches tempted the appetites of the greedy in more powerful nations, who schemed their way into the country for the purpose of bleeding it. For more than fourteen hundred years, conquerors from the East and from the West forced their entry into the territory of these peaceful, home-loving, agricultural people. In the case of the Turks, the country was held in subjection for as long as four centuries. In self defense the Serbs developed, over these centuries, an art of unsurpassed guerrilla fighting, but their agricultural practices remained quite primitive. In the work of rehabilitation following the First World War any hope of a better life, therefore, depended on the development of better agricultural practices. To acquire the “know-how” of modern agriculture and the ability to put this “know-how” into actual practice became the principal cry of almost the entire population.

The means by which knowledge could be infiltrated existed admirably within the *zadruga* (coöperative) organizations which covered the entire country, and advantage was taken of it. Gradually the Federation of Health Coöperatives, described in Chapter II, organized a Committee on Education composed of the country's leading men in agriculture, health and sanitation, and educators who made special studies of rural life of the Nation. The Committee's principal task was to work out specific projects that would contribute to a better life for the rural population, comprising about 90% of the total population in the Serbia of 1914 and 76% of the 16,000,000 people inhabiting Yugoslavia when the country was invaded in April, 1941.

World War II interrupted this work in Yugoslavia. The author, however, as Chairman of the Committee on Education of Health Coöperatives, proceeded—in addition to attending to his war-time duties in Washington—to develop specific projects looking toward the raising of the standard of living of the rural population in Yugoslavia and in countries similarly situated, drawing upon experience and research in the United States. He has sought the help and collaboration of outstanding men and women in the specific subjects under consideration. Such help was given most generously, for the benefit of the valiant people of Yugoslavia. Many of these experts occupy important positions in the United States Department of Agriculture and in other branches of the United

States Government. Their names cannot be mentioned in this grateful acknowledgement, because their Government can assume responsibility for its own official publications only. The spirit, however, in which this help was given for the benefit of the people of Yugoslavia is a beautiful expression of the good-neighbor fellowship emerging out of this war. No words can form an adequate expression of the gratitude due these collaborators. Their help is the free gift of American citizens to their brethren in Yugoslavia, generously given in a tragic and anxious period in the history of mankind. There are other experts who likewise helped in the preparation or criticism of this material, including individuals connected with the Coöperative Movement in America and those attached to the well-known Hershey Industrial School, which offers technical training to youth. Fortunately I am at liberty to mention the names of Dr. Harold F. Cotterman, Dr. Morley A. Jull and Dr. Mark Welsh, professors of agriculture at the University of Maryland; Dr. O. S. Morgan, professor (emeritus) of agriculture at Columbia University; Dr. John A. Kingsbury, fellow of the American Public Health Association, formerly Commissioner of Public Welfare of the City of New York; and Richard Warfield, vocational agricultural teacher.

I am likewise free to make special acknowledgment to the Carnegie Endowment for International Peace, and especially to the director of the Division of Economics and History, Professor James T. Shotwell, for aid in the preparation of the manuscript and for its publication.

And grateful acknowledgment is, also, made to Dr. J. Clyde Marquis, formerly the American representative and Vice-President of the International Institute of Agriculture at Rome, for help in editing the manuscript.

Most of the experts did not intend to stop with their suggestions on paper only. They are prepared to coöperate with the people in Yugoslavia, to help introduce and apply their specific proposals. Indeed, some of them are already working along the same lines through the United Nations Relief and Rehabilitation Administration.

That such expert services are needed in Yugoslavia and would be welcomed by the people there, goes without saying. This is known by all who have worked with the villagers on their farms and in their homes. It was such experience over many years that prompted the author's two proposals at the first two United Nations' conferences to emerge out of this war—the Food and Agriculture Conference held at Hot Springs, Virginia, and the Atlantic City Conference on Relief and Rehabilitation. At Hot Springs, the author's Resolution on behalf of the Yugoslav Delegation, calling for "interchange between nations of skill and expert

knowledge in agriculture," was unanimously approved by all nations. At Atlantic City, on the author's motion the scope of activities of UNRRA was broadened to include "work-relief and training for technical occupations"; this calls for skilled personnel, to be supplied by UNRRA, to train during the relief period the youth of relief-receiving countries in useful technical occupation needed in their respective countries.

The following chapters represent, in outline, suggestions to aid the people of Yugoslavia to overcome the effects of the devastating war and to so order their activities for the future that a permanent prosperity may follow. Reconstruction is both an effort to restore the life of the people to the best standards that existed before the war and also an opportunity to plan and establish the basis for a new national economy, with full utilization of the best advice and counsel that science and technology afford. An effort was made to emphasize basic principles to be followed; details are given whenever possible as to the ways and means of execution, but with the expectation that once the reconstruction is begun trained workers will develop needed details as the projects proceed. It is recognized that reconstruction will require years of effort, and that some of the suggestions appear to be beyond the present resources and ability of the people of Yugoslavia. Nevertheless, it is considered desirable at this time to outline their objectives so that these may serve as ultimate goals. They may stimulate the ambitions of the younger generation who will have to serve the major role in the future development of the country.

This study is primarily prepared for those who believe in a coöperative way of life, the largest social and economic movement in the world, with 143,000,000 family members in forty-three countries. That being the case, it may be appropriate to set forth an extract from an appeal by the author to the Coöperatives of the United States, made at a large coöperative gathering in Minneapolis, Minnesota, on June 12, 1944:

Coöperation must replace conquest, whether it be economic or political conquest. Peace can be reached only coöperatively, by the large and the small nations participating alike and on an equal footing. The League of Nations failed in large part because it was dominated by three or four big powers whose Empires it protected, even though it was not intended by Woodrow Wilson to work that way. Unless the coöperators the world over back up Secretary Cordell Hull's pronouncements of sovereign equality of all peace-loving States, irrespective of size and strength, this coöperative principle, too, may remain only on paper after this war.

Security of any people can result only from the coöperation of all to secure and protect the rights of every other people. Real independence of nations, large and small alike, can be attained in the modern world only by the regulation of their *interdependence*. Such regulation can be real and lasting only when it is brought about coöperatively between all nations.

We often hear people say that leaders are lacking. In my opinion it is true fellowship that is lacking, Christian fellowship, if you will. Coöperatives provide such fellowship admirably and effectively.

We in the coöperative movement stand for human equality, for personal freedom, for economic progress without exploitation, for education of the masses, for social security, and for religious freedom. And in addition, the coöperatives represent real democracy in practice. They are truly organizations of the *people*, by the *people* and for the *people*. Coöperation and dictatorship are opposites. Coöperatives suffocate under dictatorship; they can breath in an atmosphere of freedom only.

A social order, such as the coöperative movement offers, provides three basic principles for humanity: personal liberty, free economic development, and political stability. Our ideal does not stop with the self-determination of nations and "the right to choose their own government," as called for in the Atlantic Charter. In addition, we want to see coöperative *interdependence* of nations as a basic essential. Then only can peace and good will on earth be assured.

We must act now and stop those "peace-makers" who would try the age-old but futile game of seeking peace by military power alone. Their efforts must be combined with the labors of those who believe in an association of free peoples working together in a Coöperative Commonwealth of Nations. Those who have been doing the fighting—and the dying—for us to prevent Fascism and Nazism from dominating the world will not voluntarily submit to any form of dictatorship. And when I affirm this, I am mindful of the grave responsibility that I speak for one million and a half fresh graves in Yugoslavia in the last war, in addition to one person out of every three—the flower of youth—who died in Serbia in the First World War for the freedom of all of us.

I will restate my proposition. Now is the time for the coöperators of the world to take advantage of the opportunity to act, if our children are to live in peace and prosperity in the years to come. I propose that we publish to the world:

1. Our determination to work for a coöperative world peace;
2. That we are taking steps for the formation of a coöperative body to be known as The World Coöperative Council for Peace.

The coöperators of the world—numbering about one-third of its population—have the greatest opportunity of our time, and the greatest obligation of our time and of our children's time, to insist that there shall be written into the next peace treaty a Coöperative Declaration of the Rights and The Duties of Man. This opportunity we should seize if world chaos in the future is to be prevented.

CHAPTER I

Problems of Reconstruction in Yugoslavia

AGRICULTURE is of first importance in Yugoslavia because it provides the main source of livelihood for three-fourths of the population and also provided nearly three-fifths of products for export before the war.

War alone has not imposed the task of rural rehabilitation in Yugoslavia. It has but greatly sharpened its urgency. To all the problems brought by the past few years of war—the scarcity of food, the loss of livestock, the wreckage of buildings in towns and country, the disruption of commerce, the shattering of homes and families—must be added the vast, cumulative weight of much older problems of inefficiency and insufficiency in the country's agriculture. Agricultural reconstruction, now so imperative, should have for its purpose not mere restoration to a pre-war level, but advancement to a sound and efficient level of farm production and family living as a basis for national development.

RURAL OVER-POPULATION

The excess of population of rural villages and the general land area presents the first problem. Eighty-seven per cent of the farms are of the subsistence category, with four-fifths of their produce going to the tables of their tillers and supplying an inadequate fare. More than 88 per cent of the 2,000,000 landholdings are from 1 to 25 acres, most of them between 12 and 15 acres. Each of these parcels must support 5 to 6 persons. Many farmers own several tiny strips, widely separated. The annual gross returns per farm are estimated to total \$250 to \$350, and cash income not more than \$50 to \$100. Poverty drives many a peasant to grow crops he can sell, even though he and his family lack enough to eat.

Poverty interferes with efficient farming. Peasants lack the cash income with which to purchase farm implements and machinery, improved seed or better livestock. Even on productive acres they suffer from malnutrition and its consequences of disease and lowered energy. Only

in the northeastern surplus region, with its wider variety of foodstuffs, is there anything resembling adequate diet. Too few vegetables are grown and consumed at home. Cow's milk, poultry and eggs are too often products to sell and are not nearly sufficiently consumed at home. Villagers in districts producing fruits and vegetables for export must content themselves with bread and dried beans, for lack of home canning facilities.

Dietary deficiencies are made more serious by crowded living quarters and inadequate sanitation. In normal years infant mortality rates in the Balkans run from 150 to 200 per thousand, as against 53 per thousand in the United States. Deaths from tuberculosis occur more frequently here than anywhere else on the European continent and is worse in rural communities than in the cities. Typhoid and malaria take a high toll, and typhus is a persistent danger. Families of six or more frequently live in one or two rooms, and many of their houses are without floors, or sanitary provisions.

EFFECTS OF THE WAR

The destruction of homes, farm buildings, tools and livestock as well as the loss of human life cannot be fully measured until some time after hostilities have ceased. The losses of about 1,500,000 of her most vigorous men and women—about one in 10—has been a serious set-back even in this country of surplus population. The losses of buildings, tools, livestock and the general disorganization of all phases of life is even more of a handicap to recovery or reconstruction. This is a special hardship upon a people already on the margin of subsistence. The loss of the already limited facilities for commerce in farm products will be the most serious to the country as a whole but can be replaced quickly through appropriate action. The poverty-stricken people on the land must be helped to slowly recover by their own labor.

The ultimate changes in national government that will result from the war cannot be foreseen, nor the extent to which national policies will be developed that will resume the progress begun after World War I. However, reconstruction can not wait on government developments. The immediate needs for food, shelter and life essentials must be produced if the people are to live. They can but resume, as nearly as possible, the practices they were following in 1939 with such aid as may be given them. The rate at which rural conditions will recover will depend upon the extent of this aid. If the national government can promptly develop a well-balanced program for Yugoslavia's agriculture, including both

short-time and permanent policies, there will be an opportunity to introduce reforms and new practices in the emergency that might otherwise take generations to inaugurate. Yugoslavia was long regarded as a source of cheap food for the more highly industrialized areas of Germany, Austria, Czechoslovakia and Italy. How the trade will be changed after this war is an open question. Should the outlet of exports to these countries decline for a time, the problem of developing more self-sufficiency on Yugoslavia's farms becomes more imperative. Greater efficiency in making a living from the land is necessary. Community self-help, as expressed in the growth of rural coöperatives in the past, appears to offer a most promising solution.

THE LAND PROBLEM

Yugoslavia covers 96,000 square miles and in 1941 had a population of 16,000,000 people. Not more than one-third of the area is under the plow. Almost another third is in forests and the rest is occupied by bare mountains, undrained swamps, wild pastures and wasteland. While only about 12 per cent of the farm land is organized on a commercial basis, practically all of the export surplus was produced upon these farms.

Most of the farms are very small and only a few of the large estates in the areas formerly under Austria-Hungary remain from the era when large holdings were universal and the farmers were serfs. The peasants usually live in villages, each household owning a little court, the family dwelling, farm buildings, and a vegetable garden.

Until the Balkan wars and the formation of Yugoslavia at the end of World War I, there were some 538,630 families, about 3,000,000 people, under the big Austro-Hungarian and Turkish landlords in the provinces of Croatia, Slavonia, Voivodina, Slovenia, Bosnia, Hercegovina, Dalmatia and South Serbia. When these provinces joined Serbia and Montenegro to form Yugoslavia in 1918, these became small landowners of the soil on which they had toiled for centuries for the foreign masters. Large estates left in the provinces which had been under century-long occupation of Austro-Hungary and Turkey were dissolved into small farm proprietorship in order to satisfy the people's conception of agricultural land ownership, that the land belongs to him who works it with his own hands and that no person should own more land than he can use by himself. An old Serbian law, to the effect that no farmer could be deprived of his homestead—house, two oxen and minimum land required for his family and the tools with which to cultivate it—was destined for extension to cover all of Yugoslavia.

SMALL HOLDINGS RESTRICT DEVELOPMENT

The division of the land is shown in the following table giving data for 1936 since which time there has been little change except what the Germans and Hungarians have made in some estates during the occupation of Yugoslavia—1941–1945.

<i>Size of holdings</i>	<i>Number</i>	<i>Percentage of the total</i>
Hectares*		
0.01–0.50	158,904	8.0
0.51–1.00	175,532	8.8
1.01–2.00	337,429	17.0
2.01–5.00	676,284	34.0
5.01–10.00	407,237	20.5
0.01–10.00	1,755,386	88.3
10–20	174,068	8.8
20–50	49,314	2.5
50–100	5,156	0.3
100–200	1,099	0.1
200–500	494	0.0
–500	208	0.0

*One hectare is 2.471 acres.

These small holdings, worked by different families, prevent large scale adoption of improved methods. Each single owner must be persuaded to improve his methods.

The advantages of modern mechanization cannot be used to any great extent on these small farms except through coöperation. The development of special machines for use on small tracts may aid in this connection. Power machines on farms began with large sizes for great open spaces but have been growing smaller as the demand for lighter units has increased. There is, however, some question whether Eastern Europe is ready to turn from animal to mechanical power until fuel supplies become more abundant and cheaper. Machinery can be introduced by government renting or coöperative ownership and may provide the incentive to rearrangement of land tracts into areas suitable to power farming.

Wholesale consolidation of small parcels of land by governmental action, such as has been done in some parts of Eastern Europe, is a last resort and painful method, in the same category as wholesale migrations of people. It certainly should not be considered until all other methods have been tried and proven inadequate.

The agriculture of Yugoslavia, for the most part, is primitive and based on customs and habits handed down for generations from father to son. It is not merely a matter of tradition; it is a way of life blending with the civilization of the country. The very conservatism of the rural population is in a degree an asset, as it prevents the farmers from risking their meager resources in undemonstrated farm practices. The average villager, though lacking education, is intelligent, receptive, and eager to improve his lot. He knows the desperate need for a change in his status. Improved practices must be proven in the farmer's own environment. Plans to make reforms, to get results, must be accompanied by education.

Such education must be brought to the village masses on their farms and in their homes by men and women of training, sympathy and understanding. Every village community has a few farmers willing to carry out an improved and properly demonstrated practice, and the majority of other farmers will follow their lead, once they are convinced of the soundness of the new method.

THE REGIONS OF YUGOSLAVIAN AGRICULTURE

The diverse physiography had led to a varied agricultural production in Yugoslavia (See Map II). Foremost agriculturally is the Pannonic Basin in Voivodina in the northeast. From this region was drawn most of the export surplus before the war. Large farms and estates on the best soil sold grain and livestock that was shipped to the more highly industrialized countries of Europe. Although the basin extends well up the Drava and Sava Valleys and along the Morava and Drina rivers to 200 meters above sea level, the bulk of export surpluses of corn, wheat and hogs originated in the plain between the Danube and Tisa rivers, with Novi Sad and Subotica as leading market centers. This is a natural corn-hog area, with wheat, cattle and sheep of less importance.

Bordering the Pannonic Plain on south and west is a rolling hill country. Here, at 200 to 250 meters above sea level, is the home of commercial fruit production, with markets at Valjevo, Bruko, and Maribor. In the hill lands north and west of the Drina cattle, hogs and sheep are raised. Dairy cattle are found in larger number in Slovenia, where there are good meadows and pastures. Southeastward in the hill regions of Croatia the average rainfall diminishes, pastures are poorer and beef cattle struggle over lean pastures. The numbers of swine and sheep increase in lower altitudes where corn is grown. The rich plains between

the Danube and the Tisa grow good corn and farms are stocked with swine, some flocks of sheep of the fine-wool type, and now and then some cattle. East of the Tisa, to the Rumanian frontier, sheep are the most important, followed by cattle and swine. Sheep and goats predominate south of the Danube and Sava. Zagreb is an important cattle market. Throughout the hill region, field crop production is largely for local food and feed. The area shows a deficit in wheat and corn, a surplus in fruits, livestock and animal products.

Mountains cover more than a third of Yugoslavia. From the standpoint of commercial agriculture they are of scant importance. Crop production is limited to a few basins and "poljes" (alluvial plains) scattered here and there in the highlands. Except in these favored areas, the mountain country produces insufficient corn and wheat for local requirements. Sheep and goat raising is the chief occupation in the high plateaus and on the upland pastures, and this is on a family subsistence basis. The sheep supply milk, cheese and mutton to the household, and coarse wool for export. Along the Adriatic, where the Dinaric Alps dip sharply to the narrow Dalmatian coastal region, the Mediterranean climate prevails. Summers are dry and hot, and the accent is on grapes, olives, oranges, lemons and figs.

Each of the several agricultural areas require separate attention with a view to their regional needs. Methods of improvement must be adopted to the local conditions. For the country as a whole the diversity of production is advantageous and can be utilized to benefit all classes if carefully planned. The surplus feeds of the Danubian basin provides a supply that should be utilized to supplement the pastures of the hill country. The latter might become the breeding ground for young meat animals to be finished in the corn belt. An interchange would have to be developed by government or coöperative agencies.

FOOD NEEDS AND PRODUCTION

A realignment of crops presses for attention. Improved standards of living, better nutrition, and a sound economy all hang upon shifts of production that will tend toward balancing the agriculture of the Nation and serving the needs of the people close to the land.

First, the improvement of the rural and urban diet entails an increase in dairy products, vegetables and other health-building foods and a reduction in cereal crops for export.

Second, the amelioration of the food problem points to a much greater emphasis on the production of livestock as against cereal production.

Third, an expansion of acreage devoted to feedstuffs is indicated as a natural concomitant of the stress on livestock. Finally, the whole sweep of readjustment of production should be done with a view to serving the domestic needs first, and export needs second.

Livestock population is low, considering Yugoslavia's potentialities. Particularly is this true of the Pannonic basin, where corn goes begging on the local markets and must be shipped abroad. Throughout the country there is room for the improvement of pastures and meadows and livestock breeds. The unimproved wild grasses and the ancient native breeds are not in keeping with Yugoslavia's hopes for progress. The livestock industry varies greatly by regions, reflecting the effects of soil and climate on feed supply.

The livestock census in the year 1937 was as follows:

Poultry.....	22,415,000 head
Swine.....	3,180,000
Cattle.....	4,169,000
Sheep.....	9,909,000
Goats.....	1,901,000
Horses.....	1,252,000
Asses and mules.....	140,000

War and occupation changed these figures, and the first post-war job is to put the animals back on the land.

Almost everywhere improvements are needed in methods of seed bed preparation, tillage, varieties and purity of seed and disinfection. Efficient use of fertilizers will increase quantity of crop production.

Coöperation should be sought of all private and government agencies in the development and coördination of plans; the recruiting of specialized workers, the training of technical leaders, and the financing of the groundwork. In all of this the material, physical and spiritual forces of Yugoslavia should be sought out and applied.

The greater part of reconstruction must be borne by Yugoslavia herself. Even if tided over the transitory period from disorder and inefficiency to the beginnings of stability and self-sufficiency, Yugoslavia, under her own effort, must undertake to carry most of the load. The government has not always shown a proper responsibility for the welfare of basic agriculture in the past. In the period between the World Wars the neglect of agriculture greatly inhibited progress, notwithstanding the breaking up of large estates.

The problem of developing new types of intensive farming to improve

the income of the small land owners is so difficult that only the best efforts of all agencies, working harmoniously together can achieve the desired results. The practices and policies that have been followed in other countries give helpful suggestions, but the best methods can only be developed by the efforts of the people of Yugoslavia.

COÖPERATION A TRADITION IN YUGOSLAVIA

The coöperative way of life is the inborn tradition of the people of Yugoslavia. When they first settled in the Balkans about 1500 years ago they began a coöperative way of living in social, economic and political structure. As old as Plato's Republic, or even older, it was one of the cradles of democracy. Each unit had a special name "Zadruga" which means "for fellowman."

The set-up of the original zadruga is as follows: The members are related by blood or marriage. All property of its members is joined and worked together. No one can alienate his share of commonly held property unless he or she decides to quit the zadruga, in which case remaining members of the zadruga have the first option of purchase at the market price. Labor and earnings of all, either within the zadruga or outside, go for the benefit of all. The business of a zadruga is managed by a "stareshina" or elder, elected annually by the majority votes of all members. A woman is often stareshina—especially in later years in the villages where the traveling homemaking schools have worked.

Farm implements and other tools of production are commonly owned by all; marketing goes for the benefit of all. Each contributes in labor in accordance with his ability; the benefits each receives from the common efforts are in accordance with his or her needs. Each member owns his or her share of the property, which can be cut out and identified, if he or she at any time decides to quit the zadruga. Frequently, the whole community, one or more villages, belong to the same zadruga. A person is known not so much by his own name as by the zadruga to which he belongs. In coöperation they produce and consume; they play, they sing and dance their kolo.

In 1895 a member of the Avramovitch zadruga from near the Iron Gate on the Danube, an economist, returned to Serbia from his studies in England. While there he studied the Rochdale system of consumers coöperatives and discovered great similarity between that system and the Serbian zadrugas. He found that they both had a social as well as an economic goal and that they are not simply another way of doing

business for profit. When this Serbian economist returned to his native land, he acquainted his own *zadruga* and others with the Rochdale practices. These practices were then introduced to form much bigger *zadrugas*, extending their scope and increasing the membership to include many families. Wisely, the traditional name "*zadruga*," so close to the hearts of the people, was retained for its own uses and for the new, modern coöperative as well, thus adapting an ancient village community practice to the widened horizon of modern life.

When the First World War broke out in 1914, 92 per cent of the people of Serbia belonged to various kinds of coöperatives. After Yugoslavia was formed in 1918, the system was introduced in those sections of the country as well where coöperatives had not existed. In 1941 when Yugoslavia was attacked, approximately 7,000,000 out of the total population of 16,000,000 of all shades of life were included in one type or another of coöperatives, although by far the majority of the members were farmers.

The coöperative movement in Yugoslavia has made a steady progress from the unification of the country in 1918. The following table shows the growth of coöperatives in numbers and membership:

1920	3,568 cooperatives		members	
1925	3,943	"	456,175	"
1935	8,738	"	918,114	"
1936	9,188	"	1,000,000	"
1937	10,144	"	1,329,000	"
1938	10,832	"	1,414,876	"

This shows that the number of coöperatives almost trebled in 17 years. The increase is even more striking when we look at membership figures, which rose from 456,175 in 1925 to 1,414,876 in 1938. About 90 per cent of these coöperatives were agricultural societies.

The Yugoslav coöperative movement was divided by the coöperation law of 1937 into three categories of organizations: local, central and national. Every local coöperative must be a member of a coöperative union and must confine its activities exclusively to its own members. All coöperative unions must be affiliated to the General Federation of Coöperative Unions, with headquarters in Belgrade.

As a rule, the local organizations have specialized character. Coöperative for several general purposes, such as credit, supplies, marketing, are rare in the Yugoslav countryside. In one village as a rule are found several coöperatives of specialized characters: one handling credit,

others domestic supplies, stock-breeding, bee-keeping, health and sanitation. In fact in Yugoslavia are found a variety of specialized agricultural coöperatives rarely to be met with elsewhere.

While the most numerous in Yugoslavia are the credit coöperatives, which are the simplest form, their number was lately on the decline. In 1925 they made up 62 per cent of all coöperatives of Yugoslavia whereas by 1937 they had fallen to 42 per cent. Consumers' coöperatives were increasing rapidly. They increased from 973 in 1925 to 2,259 in 1937, of which about 2,000 were agricultural.

There were also in 1937 livestock coöperatives, 690; agrarian coöperatives, 489; health, 125; dairy, 218; wheat-marketing, 133; wine, 138; fruit and oil marketing, 113, and other miscellaneous coöperatives dealing with insurance, poultry, fisheries, etc.

The central unions or secondary organizations to which all local coöperatives must belong numbered in 1938 in all sixty-seven. They are of three types: 1) those engaged solely in auditing the accounts of the locals, 2) those having only economic activities, and 3) those which undertook both auditing and trade or finance. In all, there were two only which confined their activities exclusively to auditing. They were non-agricultural and quite insignificant. All unions whose activities were purely economic were agricultural organizations. These unions had diverse type of coöperatives as members. There were one or two of a specialized character, like the Union of Health Coöperatives.

While a few unions were territorially of nationalistic character, on the whole Yugoslav coöperatives were neutral. Political or religious influence, though it existed, was relatively unimportant.

In addition to the diversity of secondary unions, the whole Yugoslav coöperative movement was united in a single organization, the General Federation of Coöperative Unions, founded by the coöperatives in 1919. All auditing unions must belong to it and must be audited by it. It is the highest representative of the entire coöperative movement. It has no economic activities of its own. In 1938 it had 39 unions as members, all of which were engaged in auditing local coöperatives.

The new coöperation law of 1937 anticipates the creation of a coöperative bank, to be the highest economic organization of the coöperative movement. It is to centralize the entire coöperative finances of the country. The General Federation is to remain as a moral force and policy-making body in the coöperative movement, whereas the bank is to be the principal economic power.

The financial resources of Yugoslav coöperative organization are de-

rived for the most part from coöperative sources. The savings of members, reserves and shares constitute the main financial basis. Nearly three-quarters of the organization's resources are wholly coöperative and only a little over a quarter comes from outside the movement.

AGRICULTURAL COÖPERATION

The agricultural coöperative movement of Yugoslavia had an economic influence which was quite extensive. It contributed greatly to raising the social, health and cultural level of the rural population. Practically all by-laws of coöperatives provide among the objects of their functions "to contribute to the improvement of the health and cultural condition as well as to the social security of coöperators and the members of their families."

Figures for 1938 show that there were in Yugoslavia the following types of coöperatives:

Credit	4,909
Consumers' and Supply	2,521
Agricultural—new settlements on divided estates	490
Cattle Raising	747
Coöperative Dairies	237
Insurance	182
Wheat	169
Vine-growers	162
Workers & laborers'	159
Health (including veterinary)	126
Bee-keepers	125
Building	124

Beside these there were many livestock and poultry raising coöperatives, others for purchase and use of machinery, oil pressing, fishing and sponges, small industries, and electric power stations. In 1937, 40 per cent of the livestock and 28 per cent of the wheat exported by Yugoslavia was sent out by coöperatives, the bulk of the export trade being government monopoly at the time.

The Unions with the largest membership were the General Union of Serbian Agricultural Coöperatives of Belgrade, with 243,670 members; the Union of Agricultural Coöperatives of Zagreb, with 185,000 members; the Union of Civil Servants' Consumers' Coöperatives of Belgrade with 163,056 members; and the Coöperative Union of Ljubljana with 144,475

members. There were also three coöperative schools located in Belgrade, Zagreb, and Ljubljana.

The Rural Health and Sanitation Coöperatives, a Yugoslav contribution to the Coöperative Movement of the world, were an outstanding part of the coöperative movement in Yugoslavia. From a small beginning in 1922 when a dozen associations reached about 5,000 families and 18,000 persons were treated, these coöperatives grew steadily until in 1940 there were about 134 of them, mostly in backward parts of the country, reaching about 70,000 member families and treating some 150,000 non-members. Most of these coöperatives had a "Health House" with a doctor and in some cases also a nurse. They provided medical supplies and clinics and sometimes beds for patients.

These health associations engaged in preventive and curative medicine, promoted the control of disease, general sanitary improvements and education in hygiene. This was a vital service in a country where in 1922 there was only one doctor for each 12,000 rural people, and even less of clinical facilities.

The law of 1937 provided that a coöperative may engage in every lawful business with the purpose to augment the income or to decrease expenditures of its members. It may be organized by ten or more individuals and it must be registered in the official register as provided by law. A coöperative must be managed by a Board of Directors and a Supervisory Board, elected annually by the members, each consisting of at least three members. The duty of the Supervisory Board is to supervise the work of the Board of Directors and to examine the books and accounts of the coöperative, filing a report thereon to the coöperators at their annual meeting.

At the annual general meeting or at special meetings of coöperators each member has but one vote. Exception to this rule is made in the law in the case of producers and marketing coöperatives where members may have more votes in proportion to their liabilities if that is provided in the by-laws, but even in such a case a maximum of five votes to a member is permitted.

One hundred or more local coöperatives may organize a union. Such a union must audit the books and accounts of each of its member associations at least once in two years. In addition, the function of such a union is to look after the general welfare of its members and to help organize new coöperatives.

The law recognizes the General Federation of Coöperative Unions of Yugoslavia, founded by the coöperatives in 1919, and provides that all auditing unions must belong to it and must be audited by it. This su-

preme body is charged with the duty of looking after the general progress and the interest of the entire coöperative movement. It keeps contact with foreign coöperatives. It is managed by a Board of Directors and a Supervisory Board elected by the unions, its members.

The coöperatives of Yugoslavia were laid in ruins by the Germans after they attacked Yugoslavia in April 1941. The invaders confiscated property, destroyed buildings and warehouses and arrested and deported many officials, some of whom were executed. They also tried to organize a Nazi control to make use of the organizations but without much success. The groups still existed, however, in areas where the people were not all driven away and the recovery of the old organization is being slowly restored.

A traditional movement rooted in centuries of growth cannot be easily destroyed. Farmer coöperatives are today the most expeditious means of achieving a general improvement in farming conditions and rural life in Yugoslavia. Farmer coöperation preserves that status of individual ownership and operation so jealously cherished by the independent Yugoslavs as their basic right and privilege. Measures taken to rehabilitate the agriculture of Yugoslavia should have as a primary aim the free and independent way of village life.

Credit coöperatives can form the bedrock of improvement in farm and village living. Properly managed, they provide the safest and best means for the purchase of equipment and materials needed for efficient farm operations. Through coöperation it becomes possible for several small farmers to share the ownership and use of the more efficient and expensive machines. Coöperation likewise can aid in the improvement of livestock. Bulls from high-producing dams, owned and bred by coöperatives, can more than double the output of their offspring. The same practice applies to the poultry industry in the coöperative ownership of improved foundation stock.

Marketing coöperatives could be increased in number and scope, their operations expanded to include modern processing, canning and packing of farm products, and then combined in an agency for national distribution and export. Marketing coöperatives provide a check on middleman margins and help to prevent abuses that cling to the activities of foreign buyers of farm produce. Before the war, banks controlled by German, Austrian, Czech, Hungarian, and French interests conducted agencies in Yugoslavia which engaged in buying farm products. One of the chief barriers to better relations between the agricultural southeast and the industrial countries of central Europe was the feeling that the farmers were being exploited.

Yugoslavia is endowed with rich natural resources, a varied climate, a soil that lends itself to a diversified agriculture. The call is for more and better food, a quickened and intelligently managed agriculture, better means of transportation and distribution, facilities for warehousing and marketing, sound technical direction and reorientation of the whole farm community.

Much depends upon the economic policies of all Europe. Trader barriers and exploitive economic penetration, if again permitted, would constitute a serious deterrent. But given the practical good-will of progressive political, industrial and agricultural policies throughout the Balkans, and a high resolve on the part of all Nations to protect the rights and interests of all peoples, there is ample room for optimism. Yugoslavia can work out her rural problems by herself, if given some aid during the immediate post-war period and some financial help to build for the future. Her problems are many and difficult but through coöperation many things are possible that appear hopeless if the people are not united.

GOVERNMENT AID IN ROAD BUILDING

This study is mainly concerned with non-governmental activities, having in mind the traditional way of life in Yugoslavia, especially in Serbia. Those portions of the country which formerly were part of the Austro-Hungarian Empire were well accustomed to bureaucratic control, although they were more or less restive under it. In Serbia, on the other hand, a self-reliant society had been developed, which was only strengthened during the Turkish occupation, not looking to government for aid.

Nevertheless, after the First World War the Belgrade Government successfully carried out important public works, road building receiving a major consideration. In spite of this, at the beginning of World War II there was no greater need than a new road system which would end the age long isolation of farming villages and bring them closer to city markets. The economic effect of these roads on the countryside was noticeable, and it was astonishing how much could be done with limited resources.

The need for a nation-wide program for road building is one of the greatest at the close of World War II. There is an abundance of materials for building hard-surfaced roads. For example, the road built at the end of World War I through the Macedonian mountains to Bitolj (formerly Monastir), which was so much talked of by foreign travelers, was built with the calcareous stone of beautiful appearance from the ad-

joining hillsides. The roads, with feeder lines, would have the following advantages:

1. Serving as trucking routes to assemble agricultural produce in the interior and transport it to processing export centers.
2. Transporting feed stuffs from surplus producing areas.
3. Providing routes for the transport of mineral and forest products.
4. Encouraging the expansion of tourist trade.
5. Providing a permanent network for the regular transportation of freight and passengers.

At the conclusion of the War, there will be surplus war supplies which could be utilized effectively in developing an efficient highway system for Yugoslavia. Bulldozers, tractors, trucks, explosives, and aeroplane landing field mats, for concrete reinforcing, could be used in the highway construction. These probably can be obtained at relatively low cost, and with the abundant supply of local labor it should be possible to hold the total cost of construction to relatively low levels. Obviously if new equipment and supplies for this program had to be purchased at prevailing market prices, the cost of the program would have to be quite substantial.

A comprehensive system of highways would be an important link in unifying the country both economically and culturally. Sums paid out as wages in the construction also would aid the farmers in repaying loans obtained for the rehabilitation of their farming operations. While it is impossible to estimate the cost of such road-making, with farmers' help, under government supervision, the cost would not be excessive.

CHAPTER II

The Approach to Reconstruction in Yugoslavia

INTERNATIONAL AIDS

THE joint international effort to conduct all aid by governments through a single agency as worked out in the United Nations Relief and Rehabilitation Administration (UNRRA), had been in operation for more than a year before 1945. Early in 1945 preliminary surveys had been made by agents of UNRRA and in early spring a number of officers were directed to go into the liberated areas to carry out with military and civil officials a plan to distribute relief goods of all kinds including food, clothing, medical supplies, soap, etc. In Yugoslavia the policy of operation at the outset provided that the actual distribution of supplies would be done by the local authorities. The amount of relief was to be determined by the need in relation to the resources of UNRRA.

As the situation became more stable the general plan was to bring in other technicians to survey the requirements for rehabilitation and outline plans for action. The policy was to limit the UNRRA activities to meeting the most acute needs but not to go on into reconstruction except in such cases as rehabilitation would lead into or involve reconstruction. In the case of the rebuilding of water supplies, sewage systems or electric or gas plants to provide for the actual living needs of the people, some measure of reconstruction would result.

Since food comes first on any list of relief needs it follows that the supplying of seed, tools, machines, etc., to operate the land to produce food is both emergency relief and reconstruction of the farms. While modernization is desirable the immediate objective of the international agencies will be to restore and revive as much of the self-support of the people as possible in the shortest possible time.

Numerous privately supported relief agencies have offered services in special lines to be put into action at the first opportunity. Until the national and local government policies are determined these agencies cannot be set up in full operating capacity. It would seem wise that a general agency have over-all supervision to prevent confusion, overlapping activities and the danger of not giving relief where it is most seriously needed at once.

In the meantime the people of Yugoslavia are slowly struggling to rescue themselves, to return to their homes, to recover their property and to get what they can from the land. They are compelled to operate with what they have left, according to the traditional practices that they know and to adjust themselves gradually to the impoverished conditions. No plan of government relief can be adequate to provide aid for all. Self-help, the traditional way of living of the people, must be encouraged in every possible manner.

NATIONAL GOVERNMENT AGENCIES

The reorganization of the Yugoslav Government Ministries of Agriculture, Social Welfare, Health and Education can provide coördinating bureaus to gradually take over the reconstruction activities following the emergency period of relief. But this must come slowly. Local groups of the people will and must act quickly to begin the work. The National government, if wisely directed, will utilize the native energy and skill of the local groups by giving such aid as will make their efforts at self-help most effective.

Perhaps the most useful immediate service the national agencies can render is to assemble staffs of the most experienced native agricultural leaders and social workers in each part of the country to aid in planning relief and to serve as a source of information on ways and means of meeting various local needs. Skilled leadership will be a great need for a considerable time. Many technicians have been lost, others must be returned to their home communities with sufficient support to be able to resume their activities.

A national project of greatest importance in the post-war reconstruction period will be that of preparing a national policy in agricultural development. This will require the best leadership the country affords, both in the scientific and economic fields. A well developed policy and program is an absolute necessity if consistent progress is to follow the first years of rehabilitation. A further discussion of this idea will be found in Chapter V.

EXPERIENCES IN 1918-1922 RELIEF

The self-respecting peoples of the Balkans will welcome assistance but will be quick to assume responsibility for both relief and reconstruction. Experience following the last world war provides convincing evidence of this, and a survey of that past experience is instructive now. The

framework for effective organization and leadership among the Yugoslavs was built up in the health and agricultural coöperatives and other similar societies which were the outgrowth of assistance given after World War I. These organizations can be revived and through them the problem of relief and reconstruction should be made easier than it was following World War I.

An officer of the American Red Cross, who went to Serbia immediately after World War I in 1918 to appraise the needs of the people and to determine how they could be met, reported the country paralyzed; no banks doing business, schools and the university closed and its buildings partially destroyed, practically no doctors or hospitals, but disease everywhere. The stores had little to sell except local food supplies; nobody had sufficient clothing and there was almost a complete absence of fuel. There was no transportation of any kind, except a few oxen. There were almost no men between the ages of eighteen and fifty; almost no children under the age of three.

In the face of this terrible situation, the American Red Cross and the American Relief Administration tried to help by relieving actual starvation and fighting the ravages of disease epidemics, but they had neither sufficient supplies nor sufficient personnel to meet adequately even the most pressing emergencies. Several other agencies attempted to help in the tremendous task of human and material rehabilitation. However well intentioned these uncoördinated agencies may have been, many of them met with indifferent success and some with failure. The failures were due to several factors: inability to understand the people, rivalry for funds and errors of personnel. The situation grew so serious that the American Red Cross and the American Relief Administration withdrew from work in Yugoslavia and turned over a considerable part of their assets to a new organization which merged these numerous agencies into a single federation under the corporate name of "The Serbian Child Welfare Association of America."

This new organization in coöperation with several public and private organizations which, under chairmanship of Bishop Nicholai of the Serbian Orthodox Church, formed the Serbian Advisory Council. The Council and its committees rendered great service in shaping the policy of the American Commission of the Child Welfare Association and advising the staff in the details of assisting in rehabilitation.

The aim of the Serbian Child Welfare Association was to assist the country to formulate and put into operation a sound child welfare, education, and public health program with emphasis on reconstruction rather than relief. From the outset the Serbian people participated and took

leadership in initiating and carrying out this new program which eventually they made their own. The program continued until the present war. It was conducted in a manner which profoundly affected the health conditions and the social stamina of the people of Yugoslavia. The success of this program was due primarily to the fundamental principle, that what a people are induced to do for themselves is of far more value than what is done for them.

CHILD WELFARE WORK

The program of the American Commission of the Serbian Child Welfare Association was formulated and adopted in collaboration with the Serbian Advisory Counsel, later called the Advisory Board.

Under the child welfare program, a program for the care of war orphans was initiated. It was more economical and more consistent with the strong family traditions of the people to board the children in family homes than to place them in institutions or orphanages. Accordingly, a monthly cash subsidy was given to each widowed mother and also to each family assuming the care of one or more of the dependent children. The amount of the subsidy was determined by the needs of the family and the number of children. Children of school age were required to attend school regularly. All children had to be taken at stated intervals to the health centers for examination. In addition, each home was visited regularly by the public health nurse, and dental treatment was provided for all children needing it. In carrying out the plan for aiding war orphans, the Association's workers found that the mere remnants of homes and kinship ties became valuable assets to the care and adjustment of the children.

By July 1921, 4,000 children were receiving aid. The maximum of over 25,000 was reached with the distribution of clothing in November 1921. A reduction in the distribution of subsidies for Serbian war orphans began with the first month of 1922, and by June of the same year all continuing subsidies were assumed by the Child Welfare Department of the Yugoslav Government.

EDUCATIONAL ACTIVITIES

One of the conditions upon which aid was given the families maintaining orphans was that the children of school age should attend school. This requirement could not be met at the outset because there were no schools. During the years of enemy occupation, most school buildings had been stripped of everything except the bare walls. To meet this

situation, the Association developed and put into operation a plan for rebuilding and repairing the schools. In this, as in all other measures to help, coöperation on the part of the Serbians was unfailing and effective. They contributed money, labor, or materials toward the rebuilding of their local schools.

In the districts of war-wrecked school buildings, groups of officials and representative citizens were called together to make plans and estimate the cost of repairs. The Association offered to match a dollar for each dollar contributed by the Serbian people. The local districts were given the option of contributing their share in cash, material or labor. In this way, 125 school houses were restored and in not a single instance did the Serbs fail to meet their proportionate share of the cost.

Before World War I there were a number of trade schools in Serbia. These schools not only taught various trades but turned out commercial products which very materially assisted in making the schools self-sustaining. During the war these trade schools were looted of their machines and materials. As part of the reconstruction service, it seemed wise for the Association to help Yugoslavia in reopening these trade schools. A plan was worked out whereby the Association contributed grants of money, sewing and knitting machines, tools, yarn, fabrics, etc. to over 200 schools, thus enabling them to reopen and resume operations. In almost all cases, the machines and supplies were donated subject to a stipulation that a certain number of garments should be made for orphan children of the district before the machines might become the property of the school. In this way a double purpose was served: the trade schools were equipped and the orphans were clothed.

PUBLIC HEALTH AND MEDICAL CARE

One of the first services rendered by the Association in helping Yugoslavia solve its public health problems was the establishing of health centers, so located as to serve the largest number of people in the areas of greatest need. At each health center there were usually two nurses: one for the dispensary and the other for the public health service. Medical service was rendered by an American, Yugoslav, or Russian refugee doctor. As the work progressed, these health stations also became health education centers where weekly classes were held in personal hygiene, home sanitation, pre-natal and post-natal care, and other related subjects. In addition to her regular duties, the public health nurse gave lessons in the elementary schools.

An important feature of the health center program was the service of

the visiting nurse in the homes of patients attending the health center clinics. Another valuable activity was a system of health inspection carried on in coöperation with the local school authorities. Physicians and nurses visited the schools, examined the children, and referred to the health center dispensaries those children requiring treatment for physical defects. A dentist, in addition to providing dental service, instructed the children in mouth hygiene.

Because of the lack of hospital facilities in the communities, the Association installed four-bed infirmaries at the health centers for patients too ill to return to their homes. These infirmaries became miniature hospitals where later a course of training for nurses was given.

From the very first days of its health work in Serbia, the Association had taken into each health center two young Serbian women for such practical training as could be given them by the American graduate nurses. The American nurses were too busy, however, to give sufficient instruction in the science of nursing. The Association therefore decided to open a Health Workers' School to offer a four months' course in nursing. The health center Serbian apprentices formed the school's first class.

When the Association withdrew the larger portion of its American nursing personnel from Yugoslavia in July 1922, the administration of the Health Workers' School was turned over to the management and control of the Serbian Red Cross.

The visits of the Association's health nurses and social workers to Yugoslav peasant homes very quickly revealed the great lack of sanitary living standards among the major portion of the rural population. This condition was principally due to the almost total absence of household equipment, but it was also due to the ignorance of better and more wholesome ways of living. To remedy the situation, practical demonstrations of home hygiene and sanitary living were greatly needed. Recognizing this, the Association initiated a program. Peasant girls above sixteen years of age were gathered into home-school groups of twenty to twenty-five girls and given a short course in cooking, housekeeping, sewing and dressmaking, personal hygiene and home sanitation. The illiterate girls were taught to read and write as well.

The peasant girls were taught to look after their own personal appearance and health and the health of their families, to take care of babies, and to make their homes attractive. The idea embodied in these domestic science schools was so well received by the Serbian peasants that, by the time the present war broke out, work of this kind was spreading throughout Yugoslavia.

THE TRAINING SCHOOL FOR NURSES IN BELGRADE

The most important by-product of the public health work inaugurated by the Association was the large modern Training School for Nurses at Belgrade. This was the first school of its kind to be established in the Balkans. Thousands of lives had been lost in the typhus epidemic during the First World War because there were no native trained nurses in Serbia. Because of the low grade of help employed in the hospitals of Serbia, no one resorted to the hospital for treatment unless he or she could not obtain medical services any other way.

The Belgrade School for Nurses was built by contributions of money from the Child Welfare Association and from the Serbian Red Cross. The training program was opened in November 1921 with about twenty-four student nurses enrolled. The success of the school is evidenced by the report of the veteran social worker of America, Homer Folks, a special representative of the Serbian Child Welfare Association on the invitation of the Yugoslavian Union of Health Coöperatives. After inspecting the work resulting from this American-Serbian effort at coöperative reconstruction he wrote: "If the Serbian Child Welfare Association of America had done nothing during its entire European work other than to bring into existence the Belgrade Training School for Nurses, on so sound a basis and with so sound a development as it has had, the existence of the Association and all of its expenditures would have been amply justified."

THE HEALTH ZADRUGA ORGANIZATION

After the withdrawal of the Association's American workers, a serious problem was presented: How could the continuance of the health center service be provided? The Association looked for a permanent Yugoslav organization to take over the responsibility for the administration and extension of the health center work, as well as the continuance of other activities initiated by the Association. At this time, Yugoslavia had a substantial number of agricultural zadrugas,—coöperative organizations for credit, marketing and purchasing. After careful study of the health problem, it was decided that a health arm should be grafted on the already existing coöperatives. The special proposal was made by a Serbian doctor, Dr. Gavriilo Kojitch, after through consultation with Serbian peasants. The result was the organization of the health zadrugas, of which Dr. Kojitch was the first director, which later took over the administration and control of the health centers, developed and extended their activities. The Executive Committee of the Serbian Child Welfare Association remained in existence to give continuing interest, advice and occasional assistance to the zadrugas.

In turning its work over to the health *zadrugas*, the Association was attaching its health program to an institution entirely familiar to the peasant. The peasants were already buying harrows and hay cutters, and selling corn, sheep, cattle, and poultry through the agricultural *zadrugas*. In addition, they were borrowing money through the credit *zadrugas*. It seemed natural enough that they should buy medical service, drugs, health supplies, and essential house equipment, and even procure their sick benefit funds from a health *zadruga*. As soon as the proposed plan was explained to the peasants, the registration of members of the new health coöperatives went forward rapidly. The peasant people were delighted to know that the health centers would not be closed as a result of the withdrawal of the Association's American workers.

A Health *Zadruga* Federation was formed and headquarters were soon opened in Belgrade. The Federation was to serve as an administrative and clearing center for all the health *zadrugas*. The rules for management of the health coöperatives came under the laws governing all agricultural *zadruga* organizations. The new organization was approved by the Ministry of Health, duly registered by the courts as a legal entity, and chartered for business early in July 1922. It is of interest to note that the Ministry of Health subsequently appropriated over a million dinars to the health *zadruga* work for 1923.

In the meantime, the district branches of the organization had begun taking over the Association's health centers and by the end of August all the health centers were operating under the *zadrugas*. At the close of the year, new centers had been opened and the membership had passed the 5000 mark.

Each center employed a local health worker and a doctor. A dentist employed by the Federation of Health *Zadrugas* traveled from center to center to render dental service to the members. The Federation had taken over the Association's large stock of drugs and medical supplies, so that, until the health *zadrugas* could become self-supporting, they might continue to meet the needs of the health centers. In addition to supplying drugs and medical supplies, the Federation maintained coöperative stores for the sale of other health materials to the *zadruga* members. Among the health materials sold were included soap, combs, infants' food, infants' clothing, towels, bathtubs, iron bedsteads, tables, stoves and toothbrushes.

The health *zadruga* movement became increasingly popular and spread rapidly. By 1941, the Federation of Health *Zadrugas* owned its own four-story building in Belgrade, and served as national headquarters for 134 local health coöperatives. By this time the health *zadrugas* had

become an important influence in the life of the rural population of all Yugoslavia.

The work of the Serbian Child Welfare Association of America probably covered a wider range of reconstruction activities than any other foreign relief agency functioning in Europe. Some agencies confined their work to material relief, some to material and medical relief, some others to warfare against particular diseases, and still others to educational activities. The work of the Association, however, included material relief; medical, surgical, dental, and general public health service; nursing, child welfare, agricultural, industrial, and vocational training; repair of school buildings; and finally, the organization of the peasantry into health coöperatives.

The reconstruction program of the Association was unique in that it was not conducted as an exclusively American enterprise. Instead, it was organized with the idea of working with the people of the country, sharing responsibility and costs on a "fifty-fifty" basis. It was opposed to free hand-out methods; looked forward to the permanent management and support of its work by the people themselves; emphasized reconstruction rather than relief.

A PLAN FOR AN AGRICULTURAL RECONSTRUCTION CORPORATION

The cessation of hostilities in Yugoslavia will find the country with depleted numbers of livestock, broken-down equipment, war-torn buildings and depleted financial resources. With about 76 per cent of Yugoslavia's population devoted to farming and with approximately three-fifths of the value of all exports represented by agricultural products, it is obvious that the economic reconstruction of Yugoslavia will depend heavily on post-war developments of its agricultural industry.

In this reconstruction of the country's agriculture, credit must necessarily play an important part. Without some special organization for financing the recovery progress will be exceedingly slow. Credit will be required to reestablish the farming units as an effective going concern. Equally as important as credit for the individual agricultural producer is credit for the various agencies and industries that service the agricultural industry. Credit will be needed for the improvement of transportation essential to the efficient assembly of agricultural commodities, for warehouses and processing plants to improve agricultural marketing

facilities, and for the development of technical research and services for the advancement of agricultural technology.

To assist in developing a sound program of agricultural rehabilitation for Yugoslavia, a finance organization is proposed which we will call the "Agricultural Reconstruction Corporation." It should have a large capital to be allocated to specific projects such as the following:

1. Automotive equipment for transporting agricultural produce (including repair shops)	\$ 800,000 to \$ 1,200,000
2. Regional and area warehouses for assembly and storage of agricultural products	1,000,000 to 1,500,000
3. Processing and curing plants for agricultural products	1,500,000 to 2,250,000
4. Experimental stations	600,000 to 900,000
5. Purchase of foundation livestock and seeds	2,500,000 to 3,750,000
6. Capital for coöperative agricultural credit enterprises	4,000,000 to 6,000,000
7. Operating expenses of Agricultural Reconstruction Corporation	600,000 to 900,000
	<hr/>
	\$11,000,000 to \$16,500,000

Obviously the amounts allocated to the above projects are very rough approximations. It is not possible at this time to forecast what prices and what wage rates will prevail in the post-war period. Nevertheless, the tentative allocations will serve the purpose of indicating the relative importance of the various proposed undertakings.

ORGANIZATION OF THE CORPORATION

The organization of the Agricultural Reconstruction Corporation will be dependent upon the availability of funds with which to finance its operation. As a number of the proposed plans can be provided from domestic materials and labor, it is not possible now to estimate what foreign credit will be needed, but the required investments would be rewarding both economically and in the political settlement of Europe. The Yugoslav corporation might have a board of directors consisting of representatives of the institution providing the loan funds in addition to representatives of the people of Yugoslavia. Of the latter, at least one should be thoroughly versed in operations of coöperatives and another should have a background of technical training in agriculture. After

sufficient economic progress has taken place to enable the Corporation to amortize an agreed-upon portion of the principal of its loan, additional Yugoslav representatives could be appointed, and the lending bank could reduce its representation. The new Yugoslav representatives should include at least one who is thoroughly familiar with banking practice. At such time as the loan is repaid in full, the lending bank would cease to have representation on the board.

OUTLINE OF SPECIFIC PROJECTS

A brief outline of the projects which could be undertaken by the Corporation are the following:

1. Automotive equipment—\$800,000 to 1,200,000

In order to develop a comprehensive transportation system for the assembly and marketing of agricultural products, a motor transportation system including trucks and busses would be required. A necessary precondition would be a new road system, which should be one of the first of the government's post-war public works. This motor transportation system would then be effective in linking all areas of the country so as to move agricultural produce quickly to the point of processing or exporting. At the close of the war, there should be available a substantial number of trucks out of surplus war supplies which probably could be purchased at a substantial reduction from their cost price. Some of these trucks could be purchased and owned coöperatively by groups of Yugoslav farmers. These vehicles would serve as an effective nucleus for the building up of a transportation system adapted to the needs of Yugoslavia.

2. Warehouse facilities—\$1,000,000 to \$1,500,000

As Yugoslavian agriculture is based primarily upon small operating units, an efficient marketing and merchandising of the agricultural output is dependent upon uniformity and quality of the product. Essential to obtaining a product of uniform high quality are suitable community and regional warehouses where the output of the small producers can be assembled and graded and then forwarded for processing or sale. These warehouses would serve also the purposes of storage and promote the orderly marketing of produce. They would widen the field in which credit may be employed by making possible the use of warehouse receipts as a basis for credit. Abundant local building materials are available within the country for carrying out this program.

3. Processing and curing facilities—\$1,500,000 to \$2,250,000

Yugoslavia in the past has exported a large volume of unprocessed agricultural products, such as livestock, wood, grains, raw meat, fresh fruits and vegetables. Many of these products could be processed within the country. For example, wood could be made into alcohol, turpentine, furniture, paper; meat could be salted, smoked, frozen, or canned; fruits and vegetables could be canned, preserved, dehydrated; some fruits could be made into wines and alcohol. These semi-processed and finished products are of greater value on the export market than the raw products and their processing would make use of unused local labor. The Corporation might arrange for the construction of these processing facilities and lease them to the various federations of coöperative associations.

4. Experimental stations—\$600,000 to \$900,000

In the past, agriculture in large areas of Yugoslavia has been characterized by a lack of improved seed varieties; lack of approved methods for the care and raising of livestock; inadequate fertilizer; lack of effective soil conservation practices; and insufficient and often very rudimentary tools. There is thus a need for improving the quality and uniformity as well as the quantity of the agricultural output. To meet this need experimental farms would be set up in various regions of the country to test new varieties of seed and livestock and develop approved methods of production. These farms would also grow or obtain approved seed varieties and foundation livestock for exchange to farmers so as to quickly enlarge and improve the agricultural output.

5. Foundation stock and seed—\$2,500,000 to \$3,750,000

In order to carry out the improvement program to be fostered by the experiment stations, a fund would be necessary to finance the acquisition of foundation stock and seed from abroad, and, subsequently, to grow such stock and seed within the country. Such seed and foundation stock would be made available to agricultural producers on credit or, if the government provides a subsidy for the purpose, exchanged for an equivalent amount of seed or livestock owned by farmers. Funds authorized under this project would therefore implement the program of the experiment stations in bringing about a permanent improvement in the agricultural output of the country.

6. Capital for agricultural credit—\$4,000,000 to \$6,000,000

To finance the rehabilitation of Yugoslavia's agriculture effectively, an allocation of funds would be set aside for the recapitalization, through

the purchase of its bonds, of the Privileged Agrarian Bank. This institution was the major federally sponsored agency set up for financing pre-war agricultural credit requirements. So long as the Reconstruction Corporation held the bonds of the Privileged Agrarian Bank, annual returns to stockholders of the bank would be limited to a rate not in excess of 6 per cent. Net earnings of the bank, after the setting up of adequate reserves and payment of dividends, would be devoted to the retirement of the bonds held by the Reconstruction Corporation.

Economic conditions after the war may require the setting-up of a program for the compromise and adjustment of agricultural indebtedness. In the event that it becomes necessary to institute such a program, the Bank would be authorized to issue additional bonds in exchange for the scaled-down claims of private creditors.

Coöperative activity had been developed to a high degree prior to the war. The regular financing of Yugoslav agriculture, therefore, should be based upon the reestablishment of the previously developed coöperative agricultural credit facilities. In many respects, however, these facilities should be reorganized so as to make them more effective in meeting the problems inherently characteristic of Yugoslav agriculture. Certain suggestions for the reorganization of these facilities are outlined below.

THE PRIVILEGED AGRARIAN BANK

The following modifications in its operation are suggested:

1. The operations of the bank would be divided into two departments, "Long-term mortgage credit" and "operating and production credit."

2. In order to reflect more fully the interests of those who are closely acquainted with the technical aspects of agriculture, the administrative council should be reorganized to consist of a group of five members, made up as follows:

- 2 technically trained in the field of agriculture
- 1 representing the agricultural coöperatives
- 1 representing industry
- 1 representing commercial banking.

3. In order that the functioning of the bank may not be subject to undue political interference, it is suggested that one member's term expire each year so that initially one member would be appointed for a one-year term, the next for two years, etc. The full term would be for five years.

Provision should be made for the gradual acquisition of that portion

of the capital stock now held by the Government and its resale to the various agricultural coöperative associations dealing primarily with farmers. This should take place through the gradual building-up of stock subscriptions of the local association in their affiliated federation, which would, in turn, subscribe to the stock of the Privilege Agrarian Bank. Where existing coöperative associations are not in position to finance local farm operators, or where such associations are lacking, the bank should be charged with the responsibility of fostering new associations to meet such needs.

In building up the new facilities through which credit may be advanced, it seems desirable to capitalize on the experience of the large number of farmers' coöperative associations in existence in Yugoslavia prior to the war. The local coöperative, in addition to servicing long-term mortgage loans, would be the medium through which operating and production loans would be made to farmers. It would operate under the following provisions in making such operating and production loans:

1. The local association would be permitted to charge its borrowers a rate 4 per cent in excess of the rate which the association would be required to pay for the advances obtained from the Privileged Agrarian Bank.

2. The annual net earnings of the local associations would be apportioned as follows:

- a. One-half allocated to its reserve fund until such fund equals 20 per cent of the average amount which it borrows from the Agrarian Bank.
- b. Twenty per cent will be paid in to the Agrarian Bank as an insurance fund in meeting extraordinary losses of all member credit coöperatives.
- c. The balances would be allocated as dividends or further additions to reserves.

3. Losses of a local association in excess of its reserves would be borne jointly by the local association and the Agrarian Bank. All future earnings of the local association, subsequent to such division of losses, would be required to repay its share of the accumulated loss and to build up its reserves to the level existing prior to the division of such losses. Associations with accumulated losses would be permitted to accept new loans at the discretion of the Agrarian Bank.

7. Operating expenses of The Corporation—\$600,000 to \$900,000

As it is contemplated that the execution of most of the programs out-

lined above would be carried out primarily through institutions organized within the country, the actual operating costs of the Corporation should be relatively low. The achievement of the initial phases of the program would require possibly a period of three or four years.

GENERAL CONSIDERATIONS

Although the predominance of agriculture in the country's economy warrants careful consideration of the problems of increasing farm production, this does not imply that important programs should not be adopted to expand the mining and manufacturing activities of the country. Yugoslavia has rich natural resources other than farm land which should be further developed to increase the national income of the country. Such expansion will contribute to a higher standard of living for both its urban and rural population. The increase in the efficiency of production of both agricultural and non-agricultural industries is essential to the acquisition of the foreign exchange which will be needed to help finance Yugoslavia's post-war economic reconstruction.

It should be noted that the granting of long-term foreign credits in the post-war period, either for agricultural or for nonagricultural purposes, must be administered carefully to avoid undesirable inflationary developments. An inflow of foreign purchasing power without a corresponding expansion in imports or of domestically produced goods would merely result in an unhealthy bidding up of prices of scarce resources. To the extent that funds may be available, local investment as well as foreign credits should participate actively in the reconstruction program.

RESTORING THE COÖPERATIVES

The deep-rooted character of agricultural coöperation in the life of the people of Yugoslavia will assure its quick revival under a free government. As the rural peoples begin to rebuild their homes the old spirit of self-help through community coöperation will begin to assert itself again.

Impoverished coöperatives can proceed but very slowly. A broadly conceived and nation-wide scheme of aid to coöperatives is vitally necessary if revival is not to be seriously delayed. Whatever relief measures are developed by the national or state governments will find in the coöperative groups the best existing agencies for local administration. To use these groups will serve the dual purpose of giving aid more promptly as well as to strengthen a permanent local body through which to make more long-time reconstruction advances.

As this is written there are plans under way for help by the Coöperatives of America that might well advance the movement more rapidly and at the same time advance the cause of international coöperation. These plans include international coöperative trade of magnitude and importance such as oil, fuel, farm machinery and equipment, fertilizers, etc. Above all else international coöperative sympathy and good-will has developed greatly during the war period. It is safe to state that the Coöperatives of Yugoslavia could secure most of their post-war requirements in machinery and farm equipment through the Coöperatives of America if they so desired.

CHAPTER III

Suggested Programs for Agricultural Reconstruction

INTRODUCTION

THE vast experience of the world in agricultural practice, science and social organization provides a great reservoir of knowledge to be tapped for guidance in planning for reconstruction. Many organizations and committees have been working on such plans since the war began. Yet the results are far from complete and procedures must be decided as the reconstruction work actually begins. In an effort to draw upon the most mature and skilled judgment of the many specialists in the United States the topics covered below were presented to various experts with the request that they prepare brief summaries of suggestions on each topic to be a general guide to those who will have the practical task of the reconstruction of agriculture in Yugoslavia. Many of these authorities hold responsible positions in the United States Department of Agriculture. In coöperating in the preparation of these articles their suggestions have been made as those of individuals and the government is in no way responsible for the ideas presented.

Some of the suggestions involve a radical modernization of life and practices in Yugoslavia, much in advance of what natives there may consider possible. Such high ideals are included purposely to stimulate the young people of Yugoslavia to begin to think of the task of bringing their homeland forward quickly with a rapid improvement such as followed World War I. Out of the calamity of this war perhaps a new era will begin that will lead to new higher standards of living for all the Balkan area in a generation.

These suggested programs begin with those designed to promote better living in the shortest possible time, followed by others that will require long and careful national planning to reach a stage of general usefulness, as in the case of electrification of farms. While the proposals are directed primarily at agricultural problems, it is recognized that the general urban and industrial development must proceed at the same time and that in the national economy there must be closer coördination of city and country, national and local government and universal education.

Finally, the prime essentials of agriculture, the cultivation of the soil,

care and breeding of plants and animals, the production and marketing of food and other products of the land have not changed much through the ages and are determined by the skill and diligence of the people. Science cannot direct itself and the goal is reached only by the work of trained hands directed by trained minds. The emphasis rests therefore upon organization and education. The coöperative organization will make available the leadership of those best fitted to lead toward better things by self-help and community help while widespread educational facilities will bring the benefits of science and the best practices of all the world to everyone who seeks knowledge. These facilities have been vastly improved during the last two decades. Methods of general education have been developed through extension teaching, the printed guides, radio and motion pictures to provide almost universal access to the best instruction that the world affords for those in the most remote situations. As the development of transportation and communication are the measures of the spread of civilization the rapid progress in these fields during the last two decades provides the means for more rapid recovery than existed after any previous war in the history of the world. The following suggestions are presented with due modesty and the realization that none are given in full detail. Once the general plan is worked out the extensive literature on the technical details can be quickly assembled from those countries that have made the most modern advances in each field.

A FARM HOME LIVING PROGRAM

A satisfactory level of living for all the people is a constant challenge to every country, for strong people make a strong nation. Even in an emergency such as now faces the people of Yugoslavia it is desirable to think in terms of a satisfactory living. In the United States the Farm Security Administration, a government agency working with low income farm families, believes that a satisfactory living for the family includes adequate food, clothing, housing, sanitary and health services; cash income for current operating expenses; necessary improvements and replacements; security from excessive debt; education for each child; participation in community life; security for old age.

A satisfactory level of living for all the people will be a long-time objective which can be accomplished only by the fullest coöperation of the people working together with government to make the best possible use of their country's available resources. It requires a recognition that man cannot live and work without good food and clothing and housing and

sanitary facilities and medical care. He cannot make a living and become self-reliant without access to tools or land or a job. He cannot use his tools or land or succeed at his job without developing his skill and ability. He cannot be self-reliant if he has no voice in the affairs of his community and does not share in the life of his neighborhood.

When the United States faced the problem of helping thousands of the low income farm families reach a better level of living, a special agricultural program was set up by the government to make loans to farmers who could not borrow through regular credit channels. It was soon seen that these farmers needed more than loans. Out of this realization grew "the credit plus education" program of the Farm Security Administration. This program was designed to fit the requirements of small family farmers who lacked opportunity to become self-supporting and efficient, to whom other sources of credit were closed. Loans are made on the basis of sound planning for both the farm and the home.

Planning begins by helping the farmer and his wife analyse their own farm and family resources and the resources of the community that are available to them. The next step is to help them secure the best possible tenure arrangements, and plan those enterprises which make the best use of family labor and land. Orderly marketing of crops and livestock is part of the planning. Consideration is always given to planning those crops and livestock which will provide the best living possible for the family. Along with planning for the farm, planning for the family's living is very carefully worked out.

The kinds and amounts of foods needed and how much can be produced on the farm are among the first considerations in planning with the family. How many cows are needed to furnish an adequate year-round supply of milk, how the cows can be fed and cared for to get maximum production are discussed in planning the year's supply of milk. Similar discussions follow on poultry, the meat supply and the vegetable garden. A food preservation budget that is nutritionally satisfactory is developed with the family, in terms of quarts of tomatoes, other vegetables and fruits, meats, pickles, jams and jellies.

The plan also includes the making of a budget for both farm and family living expenses and the needed improvements for the home such as repairs to the house, screens, sanitary privy, safe water supply, purchasing additional equipment, providing for corrections of physical defects and planning for using community and educational facilities.

Money can be loaned to farmers not only to obtain livestock and equipment for operating the farm but also to provide for needs of the home and family. Many families, when they came to Farm Security,

were unable to cook meals properly because they lacked cooking utensils. They had no means of taking care of milk and butter. They were unable to can properly because they lacked necessary canning equipment; they were unable to store food for winter because of lack of any kind of storage facilities. Families have been assisted in meeting these needs.

MINIMUM OBJECTIVES

For low-income farm families the Farm Security Administration determined some minimum essentials in family living which could be used by families as a basis for their planning.

1. Food in sufficient quantity and variety to protect the health of the family. To produce an adequate supply of food requires adequate land for spring and fall gardens with tools, insecticides, fertilizer and seeds; fruit trees, berry plants, nut trees to provide fresh fruits and enough for storing, drying and canning; cows to provide three to four cups of milk daily for each member of the family; one hog to butcher for each two persons in the family; poultry to produce twenty to twenty-five dozen eggs for each member of family; and, provision for storage of canned and dried food, meats, root crops and other vegetables and fruits.

2. Minimum clothing needs are: At least one change of clothing for each member of family, suitable summer and winter clothing for children to attend schools and for all members to participate in community activities, clothing for protection against severe weather, and clothing for sleeping.

3. Medical and dental care, hospital and other health services available to each family at a cost within their ability to pay.

4. Housing and sanitation requirements depend upon the locality: A house which will provide a safe place for living with roof that does not leak, windows and doors weather tight, chimney safe against fires, floors and walls that can be kept clean; storage space for food, clothing, household equipment; protected and safe water supply; screening for protection from flies and insects; and, a sanitary toilet.

5. Furnishing and equipment will vary greatly but the following is a reasonable objective. Sufficient beds for not more than two persons to a bed, separate beds for boys and girls, one chair for each person in the family; a dresser, with mirror, in each bedroom; a table for eating and cooking; a stove for cooking; three sheets and four pillow cases for each bed; adequate bed covering to keep fairly warm; two towels for each person; table or desk or box for business papers; two lamps; enough cooking utensils to prepare meals and serve all members of family to eat at

one time; utensils for milk—pails, strainer, pans or crocks, churn; equipment for preserving food includes a pressure cooker and jars, drying rack, containers for dried food, crocks and other containers for brined or salted foods; equipment for cleaning—broom, mops, brushes; laundry equipment—a minimum of two tubs, wash board and clothes line; and, equipment for sewing and mending clothes, repairing shoes. Each family should have individual or coöperative use of a sewing machine.

THE FAMILY'S FOOD SUPPLY

The right kind of food and in sufficient amounts is one of the first essentials of a satisfactory living. Lack of proper food affects the health, working efficiency and morale of the entire family. Persons on poor diets may not always show clinical symptoms of pellagra or beriberi or scurvey or other symptoms that would mark advanced stages of malnourishment. But symptoms such as chronic fatigue, digestive disorders of certain types, or a general below par feeling may be the result of malnutrition.

Rural families should make full use of the resources of their land in bringing about and maintaining a satisfactory level of nutrition. This may not mean producing more of every kind of food; it may mean increasing production of some foods and decreasing production of others. It is important that the kinds of food be produced which will make important contributions to the diet in minerals, vitamins and high quality proteins. Such food as milk, butter, eggs, vegetables, fruits and meats should be produced on the farm in sufficient quantity to meet the needs of the family.

Every family should grow the kinds and amounts of food to provide three healthful meals every day in the year with a minimum of purchased foods. In America many farm families believe that the acres on the farm which produce the family's food supply are the most profitable acres on the farm and yield the greatest returns to the family in terms of health and money saved.

Below is given a good food guide:

A green or yellow vegetable at least once a day.

Tomatoes, oranges, grapefruit, raw cabbage or raw salad greens, once daily.

Potatoes or sweet potatoes, one or more servings daily.

Other vegetables, fruits, two or more servings daily.

Milk, three to four cups daily (1 oz. cheese equal to 1 cup milk).

Meat, poultry or fish once daily if possible.

Eggs, four or more a week per person.

Dry beans and peas or nuts, one to four times a week.

Bread, flour, cereals, at every meal.

Whole grain or enriched are best.

Fats and oils, butter, olive oil, some each day.

Sugar, sirup or preserves some each day.

This means that in a year one person needs about: 100 gallons milk, 25 to 30 dozen eggs, 125 pounds lean meat, poultry, fish, 25 pounds lard, fat pork and bacon, 5 bushels potatoes, 10 to 20 pounds dried beans and peas, nuts, enough other vegetables, tomatoes and fruit for daily use either fresh, stored, dried or canned—30 quarts each of tomatoes, vegetable, fruit and 10 quarts of canned meat, poultry or fish. Also 1 bushel of any whole grain for cereal and 150 to 200 pounds of flour and/or cornmeal. Sweets—50 to 60 pounds including sugar for canning, sirups and honey.

MILK FOR FAMILY USE

To produce a year-round supply of milk at least two cows, five or six sheep, or three or four goats are needed. The size of the family would determine the number needed. However, when two cows are in full production the average size family may have more milk than it needs. Such a surplus, if of good quality can always be made into cheese or sold as cream or butter thereby adding to the farm income. When an abundance of milk is available, more will be used. With only one cow there would be a dry period of about two months, when the family would be without milk. If a family can keep only one cow this problem might be met by families planning together for freshening dates and sharing milk with each other during the dry periods.

Milk requires careful handling to keep it sweet, wholesome, and pleasing to the taste. Cleanliness and proper cooling are the best preventives of early souring. The cleaner the milk and the sooner it is cooled after milking, the longer it will stay sweet and have a good flavor.

The three C's for keeping good milk good are: Keep it clean, cool and covered.

It is very important that milk be pasteurized for use as baby food. This can be done at home by placing the milk in clean bottles or glass jars and then placing the bottles on a rack in a pail filled with cold water nearly to the top level of the milk. Heat until the milk is 145° F. or hot to the touch. Remove the pail from the heat and leave the bottles in the hot water for 30 minutes, reheating if necessary, to keep the milk at 145°.

After the thirty-minute period, replace the hot water gradually with cold water until the milk has cooled. After cooling, keep the bottles in the coolest place possible.

Each family should have a flock of about 35 to 50 hens. If they are of a good egg-laying strain and are properly fed and sheltered they should produce eggs for family use the year round. At least one hundred chicks should be raised each year for replacements and meat.

Every farm family needs to produce as much of this meat supply as possible. The number of meat animals needed depends upon the size of the family and the weight of the animals. Two hogs and a veal calf at least eight weeks old, or two hogs and two lambs could well be used by the average family. Hogs are recommended to help in meeting the need for animal fat. A 200-pound hog, live weight, will yield about 20 pounds of lard and 25 pounds of fat cuts.

Every rural family should have a garden which will produce a sufficient supply of fresh vegetables for the family throughout the growing season and enough extra for canning and storing for use throughout the year. The garden should be from one-half to one and one-half acres in size, depending upon the size of the family and the kinds and amounts of vegetables that are grown.

Varieties of vegetables should be grown which are best adapted to local conditions. Where soil and climate permit, special emphasis should be given to growing tomatoes in ample quantity for canning in order to supply the vitamin C during the winter months unless citrus fruits can be grown. If soybeans are not being grown they should be introduced. Green and yellow vegetables for home use should be increased. Potatoes and cabbage are high in food value and should be grown in sufficient quantities for year-round use.

A kitchen orchard is needed by every rural family. Several fruit trees of the kinds and varieties that will grow in the area should be planted. Berries, grapes, and small fruits should be grown to furnish fruit before fruit trees come into bearing.

HOME PRESERVATION OF FOOD

The preservation of food for use in the non-growing months is of equal importance to producing food. The method of preservation (storing, drying, curing, smoking, brining or canning) a family uses should depend upon the equipment and facilities available, and the process which results in the best product. Many vegetables and some fruits can be stored and kept without drying and canning. However, most green vegetables

which contribute so much to health and give variety to the winter food supply must be canned or frozen. Every family should make a canning and storage budget to determine the kinds and amounts of each food needed to be preserved in order to have an adequate winter supply as outlined above. The amounts needed will depend upon the size of the family, the length of the growing season when fresh fruits and vegetables are available. Foods should be preserved when they are most abundant and when they are at their best flavor, color, texture and appearance. For canning fruits, tomatoes, pickled vegetables a boiling-water bath is satisfactory. These acid foods can be heated safely by boiling water. For meats, corn, peas, beans, and other common vegetables, except tomatoes, and a steam pressure canner should be used, since to process these foods safely in reasonable time takes a temperature higher than boiling, 240° F. or higher. The only way to get these high temperatures is to hold steam under pressure. The pressure-canner is so important in the preservation of food that special arrangements should be made for the manufacture and distribution of this equipment among farmers. The larger sizes might well be owned and operated by a group of families in coöperation. For home use, pressure canners of from 18 to 21-quart capacity have been found most satisfactory. While larger canners are available on the market, they are too heavy and too awkward for the homemaker to handle. The smaller steam pressure outfits, of 10 to 12-quart capacity, are useful for cooking rather than canning. They hold only a few cans at a time, and it is almost impossible to operate them so that the pressure does not fluctuate during the processing period.

STORAGE OF VEGETABLES

Vegetable storage, the ages-old method, is a very good method of preserving certain vegetables if properly handled. It is quicker, cheaper and easier than canning, drying or freezing. Stored vegetables keep most of the food value and original flavor. Where the family members have limited means for other types of food preservation, they will find it profitable to grow more vegetables and fruits that can be stored.

Vegetables may be stored in a basement storage room, an outdoor storage cellar, or outdoor pit. The most desirable space is a well insulated, well ventilated basement storage room. A cool, well ventilated cellar under the dwelling offers good conditions for storage of vegetables. A corner of this cellar or basement having a window in it is most desirable but avoid a south exposure.

Outdoor cellars or caves properly ventilated are excellent for storing

many vegetables, especially root crops, cabbage, kohlrabi and potatoes. Fresh vegetables may be stored in outdoor pits—except those things needing dry storage as dried beans and peas, onion, pumpkin and squash. The vegetables are arranged in a cone or “A” shaped pile on a well-drained, straw covered hollow and then covered with layers of straw and soil until the covering is thick enough to prevent freezing. Provide for ventilation by extending part of the first covering of straw through the top or by inserting a flue. In either case, place a suitable cover over the ventilator to keep out water. Ventilation is most important during the fall; the ventilator should be completely closed once severe weather begins.

All food campaigns should feature the growing of garden crops for preservation for winter use. This is particularly a need in Balkan countries where the winter food of the people has been confined to bread and dry beans in too many cases.

A CROP IMPROVEMENT PROGRAM

THE two most important ways of improving yields of crops are better fertilization and better seed. The first is an essential in any case for even the best of seed cannot thrive on poor soils. But the improvement of soils not naturally fertile is a slow and expensive process. Much time and capital are required and it is not a short time emergency operation. The application of commercial fertilizers can be done quickly but even this method of fertilization does not at once add the humus so needed on old worn soil.

The importation and distribution of commercial fertilizers should be a part of the rehabilitation work and as rapidly as farmers can afford to do so they should begin the use of fertilizers to improve crop yields. For immediate food production the importation of a quantity of fertilizer will pay good dividends. Its application will involve the distribution of the machinery to apply the fertilizer which must be a part of the farm machinery program.

SEED IMPROVEMENT GIVES QUICK RESULTS

The quickest method of increasing crop yields is by the use of better seed. Increases of from 5 to 20 per cent can be made at once by using the best known seed compared to the common run of farm grown seed. In Yugoslavia areas where seed improvement has not been given special

attention the returns would perhaps be even larger, provided that varieties and types suited to the areas are carefully selected.

There are several methods generally used in America for improving crops and seed. The first and most common is the careful selection of old varieties where existing varieties of wheat, oats, rye and barley have become mixed. This mixing occurs in saving seed and by improper care in planting. The best method to clean these varieties is by hand selecting, in the field, the varieties that are true to type. This hand selected seed can then be planted in a small plot and cleaned of impurities until the variety is again pure. This small amount of seed can then be multiplied from year to year until sufficient quantity of seed is available for general use. This method of crop improvement will be profitable and requires very little work or supervision.

The second and most widely used method of crop improvement is the development of new strains or varieties. This is generally done in one of two ways. First, outstanding individual plants in any variety can be selected and increased by planting over a period of years. Second, two existing varieties can be crossed and then the progeny from this cross, increased for a number of years. After the cross has been made the method used is very similar to the method used in multiplying seed of old varieties.

A third method of crop improvement is the one that has been used extensively for the past ten years in the United States in the development of hybrid corn which will be discussed at length further in this program.

SEED REQUIREMENTS OF YUGOSLAVIA

It is estimated that in 1939 there were the following acreages of crops grown in Yugoslavia:

Wheat	5,443,860 Acres	2,875,612 Tons
Barley	1,027,315 "	424,223 "
Rye	638,327 "	243,514 "
Oats	881,604 "	348,258 "
Maize	6,624,705 "	4,045,606 "

From the above figures it is evident that it would take approximately the following amounts of seed to plant the acreage on the following crops grown in Yugoslavia:

Wheat	10,000,000 bushels
Barley	2,000,000 "
Rye	900,000 "
Oats	1,600,000 "
Corn	1,000,000 "

From these figures it is quite easy to estimate how much more food would be available if through good methods of seed and crop improvement yields were increased from five to twenty per cent. Certainly any region could well afford to start such a program and build a field seed service for its farmers.

There is a wide diversification in the acreages and kind of crops grown in different parts of the country. Seeds must be provided to meet the needs of each locality. The largest single factor contributing to inefficiency is the seasonal nature of a specialized seed business. To process and handle seeds for a community means large outlay of capital for storage and cleaning equipment. If this cleaning equipment can only be utilized for a few months out of a year, the investment is high and inefficiency results.

A Regional Farmer's Coöperative would be the best organization to set up a plant and start a program in a small way on all seeds including vegetables. By not specializing in one particular kind of seed the plant and cleaning facilities could be utilized on a yearly basis. Seed improvement requires the development of skilled labor in crop improvement, in machine operation, and management.

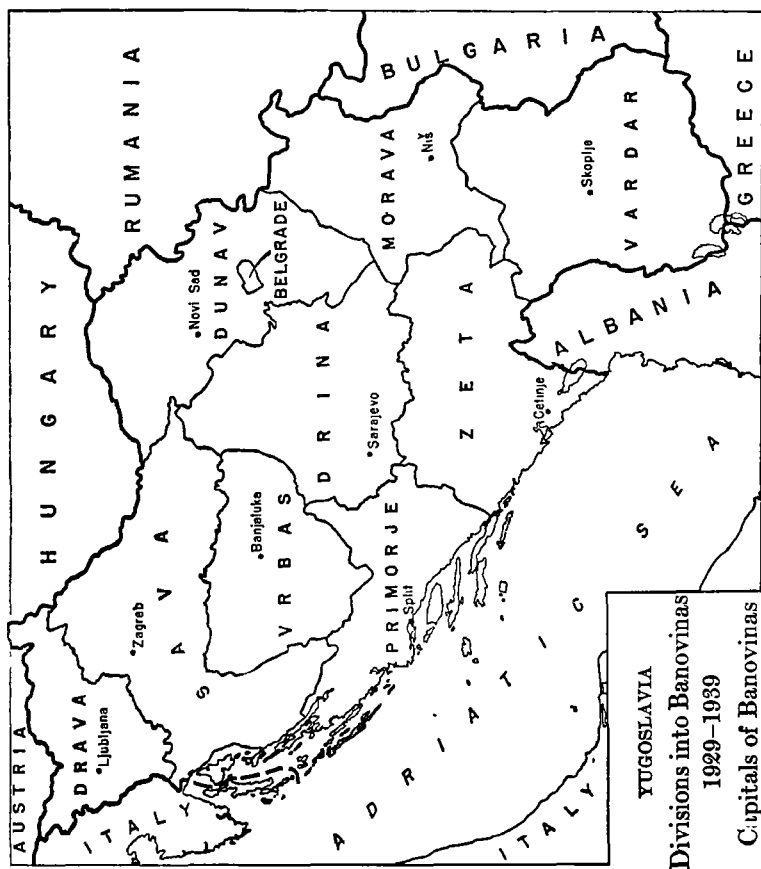
FOR BETTER SEED CORN

Corn is the principal grain crop in Yugoslavia and probably contributes more to the national economy than any other crop. It is considered a principal food of three-fourths of the population, and an effort to improve the corn crop offers one of the most promising ways of increasing the agricultural output.

The use of hybrid corn seed in the United States has grown from a small beginning before 1930 to the present when such seed is used on more than half the entire acreage of corn in the United States. It has been shown time and again in the United States that the yield of corn can be easily increased fifteen to twenty per cent immediately by the use of good hybrid seed.

This program did not develop suddenly. A great amount of research was needed to determine where various hybrids were adapted and where they would produce well. This work was done by government and state experiment stations as well as by private seedsmen.

The first and most important thing in building a hybrid corn program is to find hybrids that are adapted to the area in which they are grown. This might take a year or two of survey and research in Yugoslavia. Perhaps the best start would be to make a survey of the corn growing



Drawn in the Department of State, Office of the Geographer, June 21, 1943.

areas of Yugoslavia and determine the type of corn used, the length of time it takes the corn from planting to maturity and the conditions under which the crop was produced. On the basis of this survey it would be easy to take hybrids from America, of which there are hundreds ranging in maturity from seventy to one hundred thirty days, and find some of these hybrids that would fit in Yugoslavia. At the same time this was being done, a program could be started to develop hybrids from the corn already used in Yugoslavia. This type of a program would require approximately eight to ten years before the people of Yugoslavia could have hybrids from their own native varieties.

It is quite reasonable to assume that the United States has many hybrids in existence which, if the adaption were ascertained, could be used to an advantage in Yugoslavia. It would be necessary that production of seed from these hybrids be carried on in Yugoslavia by the coöperatives or government seed farms.

It would be almost impossible to have immediate results by using only the native varieties of corn grown in Yugoslavia for the following reasons: 1) In order to make a hybrid, it takes approximately seven to nine years of inbreeding native strains to develop a pure line. 2) It takes another year to cross what is known as two pure lines to make a single cross. 3) It takes one additional year to grow two of these single crosses together into a hybrid.

Even after these steps were all taken, it is rather doubtful if any one organization alone would be fortunate enough to have a group of good hybrids in every maturity range.

To speed up this program, it is suggested that the regional coöperative or government stations take the following steps: First, make a complete survey of the corn producing areas in Yugoslavia and determine what varieties of corn are most widely used and the amount of difference there is in the maturity of these varieties. This information may be already available in the old agricultural stations or among some corn growing farmers.

In certain areas in the United States not more than one or two hybrids are needed for the total area. In others extreme varieties of soils coupled with the variation of altitude and temperature need twelve to fifteen different hybrids in order to furnish each production area with the corn best suited to its growing conditions. These conditions will probably be typical of what will be found in Yugoslavia.

Second, after the survey has been made the production areas in Yugoslavia could be compared in climatic conditions and length of season to similar areas in the United States. From these areas could be picked a

number of outstanding hybrids. For any particular area, the United States would probably have from five to twenty outstanding hybrids that might be usable in Yugoslavia. Small quantities of these different hybrids could be then sent to Yugoslavia and tested along with the native varieties to determine the potency and yielding ability of similar conditions with native corn. The agricultural colleges carry on these tests throughout the United States every year. It would not be necessary to carry on as extensive a program in Yugoslavia as has been done here, but a few well-located tests would cover most of the growing conditions in Yugoslavia.

As soon as some indication was shown that there were already existing hybrids that could be used, the seed farms in Yugoslavia could procure from the United States, small amounts of seed stocks to start a program of commercial production of these hybrids to be distributed to their members for commercial production.

Third, at the same time hybrids from the United States were being tested in Yugoslavia, a program of assembling the native strains of Yugoslavia could be started and inbreeding work could be done to start the development of hybrids from the native varieties. Such a program should be in operation two or three years before the seed station should undertake commercial production on a large scale. If the program were started in the most intensified corn producing area, by the time they had proven to have great merit in crop yield for food production, the seedsmen would be in a position to have information on the marginal areas and develop a more intensive program for these areas.

In the improved corn growing areas in the United States today, practically 100 percent of the corn is planted from hybrid seed. However, there are a number of marginal areas that, even after a ten-year development, are just now beginning to use hybrid corn. Each year, additional marginal areas are growing more and more hybrid corn. It takes a number of years to develop a program large enough to supply seed in large quantities. It would probably take Yugoslavia eight to ten years to develop a program large enough to supply seventy-five per cent of the corn needed to plant a crop in Yugoslavia, or 750,000 bushels of seed.

It is difficult to estimate the size of an operation that would be necessary to handle the volume that a regional coöperative would have at the end of four or five years of a good crop improvement program. An estimate is suggested based on actual costs and capacities of a coöperative seed plant built in 1943 to serve 50,000 patrons in the United States. This plant was built by the statewide coöperative after two years operation in a temporary building that was leased for the seed operation.

This plant has the capacity to process 30,000 bushels of hybrid corn, 30,000 bushels of wheat and 90,000 bushels of oats, 15,000 bushels of barley and a good size vegetable seed department. This plant has bin storage to store in bulk, approximately 30,000 bushels of grain. It has sufficient storage to store 30,000 to 40,000 bushels of finished products.

This plant costs approximately \$90,000. Approximately \$15,000 was for equipment and installation of equipment. The other \$70,000 was needed for material and labor. The labor cost would be much less in Yugoslavia. One plant of this size would provide seed for a considerable part of the corn growing areas of the country for several years.

Along with the operation of the seed plant, the coöperative carries on a research program to develop new strains and new varieties, and to continually improve the older varieties. In 1942 tests were carried on in sixteen locations throughout the state and in an experimental nursery which was maintained by the coöperative to produce new hybrids. Inbreds and single crosses were assembled in the nursery from all the major corn producing states. These were tested for maturity, climatic conditions and at the same time improved for specialized conditions. Along with these items were accumulated many known open pollinated corns and about 1800 hand-pollinated varieties were made in developing new inbred lines. In 1944 the size of the nursery increased from the original four acres to eighteen acres. Approximately 6000 hand pollinations were made and well over 3000 individual plantings were made of different kinds of corn.

A good seed program has much value that is reflected in increased yields, more food and a better economy. In America the hybrid corn program alone has increased crop yields tremendously. Over a period of years such a program would probably contribute more to the well-being of the people of Yugoslavia than almost any other agriculture program that could be undertaken.

A SUGGESTED SEED PRODUCTION PROGRAM

VEGETABLE seeds should be grown in Yugoslavia for planting a sufficient acreage of vegetables to meet the dietary needs of the people. The following estimates are based on certain vegetable production figures from Yugoslavian sources for vegetables grown in the vicinity of ten cities, an area with a population of about two million people. The recent Yugoslav data suggest that such small amounts of important crops were commonly grown per capita that arbitrarily those figures have been in-

ESTIMATES OF REQUIREMENTS OF VEGETABLE CROPS AND SEED PRODUCTION NECESSARY TO SUPPLY REQUIREMENTS

	Per capita allowance	Requirement for 15,000,000 people	Yield per acre		Acres required for vegetable production		Rate of seeding per acre		Acres required for seed production	Stock seed needed
			Vegetable	(Tons)	Seed	(Pounds)	Seed	Vegetables		
	(Pounds)	(Tons)						(Pounds)		
Group A.										
Beans, dry	9	67,500	0.3		750		50	50	12,000	900 T
Beans, snap	9	67,500	1.5		750		50	50	8,000	75 T
Peas, dry	3.1	23,833	1.1		1300		120	120	2,000	120 T
Peas, garden	1.9	24,300	1.1		1200		120	120	1,300	78 T
Group B-1.										
Cabbage	44	326,700	3.3		330		0.5	0.5	150	75 Lbs.
Collards	0.9	6,750	3.0		300		0.7	2.0	15	10 "
Kale	0.9	6,750	3.0		250		0.6	2.0	18	10 "
Mustard	6.5	97,500	3.0		250		2.0	2.0	65	35 "
Spinach	3.7	27,778	2.0		500		12.0	13.5	375	4500 "
Rutabaga	3.2	25,000	5.0		500		0.5	2.0	20	10 "
Turnip	2.5	18,750	5.0		400		0.5	2.0	19	10 "
Radish	2.6	19,500	3.0		300		2.0	12.0	260	500 "
Group B-2.										
Beet	8.8	66,666	5.0		400		2.0	12.0	400	200 "
Carrot	13.5	101,250	3.0		300		0.4	4.0	450	200 "
Celery	10	75,000	5.0		300		0.2	0.2	10	2 "
Chard	0.3	2,400	3.0		400		10.0	10.0	20	200 "
Endive	0.3	2,250	1.0		300		2.0	2.0	15	30 "
Lettuce	52	390,000	3.0		300		0.3	2.0	130	40 "
Onion	11.2	84,000	1.6		300		2.0	5.0	875	1750 "
Parsnip	2.5	18,750	3.0		500		1.0	2.0	25	25 "
Salsify	0.5	6,562	3.5		500		1.0	4.0	15	15 "
Group C.										
Cucumber	3.9	29,900	1.4		150		1.0	2.0	280	280 "
Okra	0.1	1,200	1.0		200		5.0	10.0	60	300 "
Pepper	2.7	21,000	1.4		25		0.26	0.26	150	40 "
Pumpkin	2.6	20,000	5.0		200		2.0	2.0	40	80 "
Squash	5.0	37,500	3.0		250		2.0	2.0	100	200 "
Tomato	34.0	265,000	3.0		17		0.14	0.14	700	100 "

creased two and one-half times to place them in alignment with the more reasonable figures. Estimates on other vegetables are made on a level approaching the per capita use in the United States.

A proposed goal of production is set forth in the tables in which estimates are based largely on United States production experience. It is realized that these estimates may be wide of the mark, but no better basis is available. Data are included for some crops that are of value in the United States but may be of little interest in Yugoslavia.

SEED CROP REQUIREMENTS

Climatic requirements and the nature of the several seed crops permit them to be grouped as to geographic distribution and as to methods of handling. All the more common vegetables are considered here, and are placed in three groups for discussion, because they should be handled at different parts of the enterprise or in different regions. The grouping, and reasons therefore, are as follows:

Group A consists only of beans and peas, which have similar climatic and handling requirements. They require large acreages because the rate of increase is low, and should be grown in areas of larger farms and fields. Both are annuals, require moderate climate, with a minimum of rainfall to mature and be harvested. Although well adapted to machine culture, they likewise can be adequately produced, harvested, and cleaned by comparatively simple equipment. They require extensive storage facilities, so production should be located near places where suitable warehouses or collection and distribution facilities can be obtained.

Group B includes the so-called "small seeds" that require dry weather for proper maturity and harvesting. A wide range of climatic requirements is represented among them and some tolerate such a wide range that there is much overlapping of sections wherein seeds of certain species may be grown. As a class the members of the cabbage family and spinach require a generally cooler, less arid atmosphere than the other crops.

Group C includes all fleshy-fruited forms, the seed of which is recovered by scraping them from the cut-open fruits or by mechanical separation from the pulped fruits, such as the tomato. Obviously, methods and equipment for recovery are entirely different from those of the seeds that mature in dry seed heads or pods. From the nature of the maturing and recovery processes, these seeds can be recovered successfully during much more humid—even rainy—periods than can the others. Tomato seed production should be accompanied by processing

equipment for use of the pulp as food. Instead of the threshing and dry-handling equipment used for other groups, these crops will require fermentation vats or barrels for "cleaning" and washing seed, and also trays or floors for drying.

There may be a question as to the desirability or need for attempting a highly "modern" vegetable seed production enterprise in Yugoslavia at this time. The benefits of highly uniform varieties grown over a wide territory for commercial use are very great in the vegetable industry of the United States, but it does not necessarily follow that such a system would be desirable in Yugoslavia. While seed supplies may be obtainable from other European countries for the emergency needs, it cannot be questioned that local seed improvement should be a part of a long-time agricultural reconstruction program.

NUMBER OF ACRES AND SIZE AND NUMBER OF OPERATING UNITS
NEEDED TO PRODUCE SEED FOR THE VEGETABLE CROPS

<i>Crop</i>	<i>Number of Acres</i>	<i>Size of Unit</i>	<i>Number of Units</i>	<i>Total seed per Unit</i>
Beans, dry	12,000	200	60	5 Tons
Beans, snap	3,000	200	15	5 "
Peas, dry	2,000	100	20	6 "
Peas, garden	1,300	100	13	6 "
Cabbage	150	15	10	7.5 Lbs.
Collards	15	3	5	2.0 "
Kale	18	3	6	2.0 "
Mustard	65	5	13	10.0 "
Spinach	375	15	25	180.0 "
Rutabaga	20	4	5	2.0 "
Turnip	19	10	2	5.0 "
Radish	260	10	26	20.0 "
Beet	400	10	40	20.0 "
Carrot	450	10	45	4.0 "
Celery	10	2	5	0.4 "
Chard	20	4	5	40.0 "
Endive	15	3	5	6.0 "
Lettuce	130	10	13	3.0 "
Onion	875	25	35	50.0 "
Parsnip	25	2	13	2.0 "
Salsify	15	4	4	4.0 "
Cucumber	280	20	14	20.0 "
Okra	60	5	15	25.0 "
Pepper	150	10	15	2.5 "
Pumpkin	40	5	8	10.0 "
Squash	100	10	10	20.0 "
Tomato	700	20	35	3.0 "

Estimates of minimum acreages of seed crops required for a long-time development, workable sizes of production units, and the number of production units and stock seed required per unit are shown in table on opposite page. Yugoslavian management will need to insure that fair portions go to the numerous local group leaders or managers who will follow through with effective production. The first table suggests total amounts of stock seed required to establish the seed field plantings of the total acreages indicated. These seed production units should be widely dispersed, under the leadership of probably 100 or more different "operators" who will contract with thousands of farmers and gardeners to produce the total acreage needed.

ORGANIZATION FOR SEED GROWING

In case there is no need to organize a special program for growing seed of field beans or field peas, the overall size of the enterprise would be reduced from 22,360 acres to 8,360 acres, which might be organized in some such detail as follows: At the top must be an expert administrator. Responsible to him might be seven experienced local men, seed-production leaders, who must be found within the country. These seven leaders would head production of (1) Garden peas and beans; and (2) All other seeds in six regions—a man for each region.

The pea and bean leader would supervise production of all of these crops of seed wherever grown, probably within a single large region in the northern plains. Each of the other six would have charge of production quotas and schedules within a single region of workable size adapted to the growing of a given list of seed having similar production requirements.

Crop groups and production areas should be outlined on the basis of seed production suitabilities, and should be reasonably compact for ease of handling the work. Each production leader will supervise a large number of farmer-leaders. It is assumed that the leader of one or a few units will be the manager of a local coöperative or a similar organization who is an agricultural leader. The units should probably be handled by the coöperative on contract with its seed-growing members. Within a region, one leader may supervise production of only one kind or several kinds of seed. There may be anywhere from ten to fifty leaders handling seed production within a region or crop group production area.

The seed grown by farmers under contract with the coöperative will be its property, the farmer serving as an agent, to be paid on a poundage basis for the seed he delivers to the coöperative. The seed will be grown

from stock seed furnished by the coöperative, and subject to careful control of purity. Each producer should have access to seed-testing equipment to insure proper quality of seed to be sold to coöperative members and to the general public. Except for beans and peas, no unit will require very large storage facilities for seed, but the storage available must be dry and rodent-proof.

Although it is assumed that most of this seed will be produced by hand or very simple methods, it would be very desirable for nearby groups of producers to pool resources to obtain simple seed-cleaning and grading equipment as rapidly as possible.

NEEDED EQUIPMENT

Modern machinery and production and distribution methods should come into use gradually as the volume of production and success of growing operations warrant them. Attempting use of certain expensive machines on an extensive scale prematurely will only result in financial loss and loss of confidence in leaders of the enterprise.

Assuming 30 full days of threshing and 100 days of cleaning work per machine per year, about 20 to 25 threshers of 600 bu. capacity per day, and 20 to 25 cleaners of 30 to 40 bu. per hour capacity will handle most of the seed that needs to be handled by such means. Obviously, production will need to be highly localized if few machines are to serve for such work.

The following minimum machinery will be required for seed threshing and cleaning: (1) 20 threshers chiefly for peas and beans; 600 bushels per day, requiring 30 horsepower each; (2) 20 seed cleaners, screen and fan type, for all kinds of seeds; 70–80 bushels per hour of peas and beans, 30–40 bushels per hour of small seeds, requiring 4 to 5 horsepower each; (3) seed cleaners, indented cylinder type, needed only for fine finishing, 10 bushels per hour; (4) hand tools, picking belts, weighing equipment and miscellaneous.

Modern threshers together with motive power will probably cost about \$2000 each in the United States and a screen-and-fan type cleaner, with motive power, about \$1000 each. Many other machines such as picking belts, chutes, elevators, weighing and bagging devices may be obtained or devised locally. Simple laboratory apparatus consisting of germination cabinets, balances, sampling and cleaning devices will be needed, at least at the headquarters of the enterprise, and preferably at a central point within each well-developed production area, also. These suggested items will not be enough to place the industry on a fully

mechanized and modern basis but will only care for the most obvious or elementary requirements.

The success of the project will depend primarily upon the ability of the administrator and staff who organize the project. If men with the necessary skill can be found in Yugoslavia or in countries with similar conditions in Europe so much the better, but in any case the importance of the project to the future food production of the country justifies employing the very best management that can be found.

A NEW POULTRY INDUSTRY PROJECT

TO RESTORE and improve the production of poultry in Yugoslavia will quickly provide food for the people and income for those on the land. Next to gardening the raising of poultry is the quickest way to produce food, meat and eggs for family subsistence.

A fifty-chick flock, with moderate care and feeding should provide a family with 50 pounds of young chicken meat, 25 pounds of fowl meat, and from 1200 to 1800 eggs during the first year. A flock of 30 hens will provide a large part of the subsistence of a farm family on a small place. With special care and management such a flock will begin to provide a surplus for sale. Poultry can be increased in numbers very rapidly through the importation of eggs for hatching in local stations. The equipment for such stations is not expensive and can be home-made if necessary with inexpensive materials.

The following project is outlined with a view to suggesting what might be done by establishing local breeding and hatching stations assisted by an organized plan for the distribution of the young chicks, the providing of some feed supplies and instruction in the care and feeding of baby chicks.

BREEDING AND HATCHING STATIONS

At several suitable locations in each province local breeding and hatching stations should be established, from each of which about 50 chicks could be distributed to each of about 2,000 families. At the beginning of the project it may be desirable to provide each family with less than fifty chicks in order to reach as many families as possible in each locality. Local people should participate in the development of the project from the start as they can advise as to the needs. Although, as a rule, co-operatives will be best agencies for carrying out this program, at the outset the establishment of breeding and hatchery stations at any public institution such as the agricultural schools is desirable.

The first year's stations probably would have to rely largely on imported equipment and imported personnel. An experienced hatchery service man might be employed as leader of the first group. The person to begin this work should have had practical experience in incubating eggs and brooding chicks, especially with oil-burning lamps and wood-burning brooder equipment. He should also have had broad, practical experience in hatchery flock selection, and in sanitation and disease control, including the testing of flocks for pullorum disease. It would be essential for the project leader to train selected local people to take over the work as rapidly as possible.

The equipment necessary for establishing one of these stations would include the following items: (1) one incubator of about 20,000 egg capacity; (2) 1,000 lamp-type brooders for brooding about 50 chicks, these brooders could be built locally or imported; (3) 100 wood-burning brooder stoves; (4) two pullorum-testing sets and about 5,000 doses of T. G. pullorum antigen; (5) about 5,000 gallons of kerosene; (6) formalin and potassium permanganate for disinfecting the incubators; (7) a few hundred tons of starting and growing mash; (8) small tools and equipment of various kinds, and (9) about 200,000 hatching eggs.

HATCHING EGGS FIRST NEED

A main problem in the initial stages of this program will be to obtain a continuous supply of hatching eggs, especially as eggs for hatching do not bear delayed transportation. Some eggs could doubtless be obtainable locally, but probably not in sufficient quantity to maintain maximum operation at the hatchery. The establishment of a nearby base of supply is therefore desirable.

The project leader will find it necessary to locate a supply base in advance of beginning to operate the hatchery.

He must find or organize a central collection point from which shipments of eggs to Yugoslavia can be made, and to contract for the delivery each week to the local station of the eggs from local flocks of chickens, tested at least once, preferably twice, for pullorum disease. He will have to locate, select and pullorum-test hatchery flocks totaling approximately 3,000 properly mated fowl. This would insure from the outset a superior foundation stock selected from chicks hatched under the personal supervision of the project leader. The eggs obtained from these flocks would be of higher quality than could be obtained from scattered flocks.

EQUIPMENT FOR A STATION

The first unit preferably should be set up in a locality where there was special interest in poultry before the war. Here it will be easier to enlist the coöperation of local leaders and members of coöperative organizations. These local leaders can help in the selection of a location for the hatchery. This location should be central with respect to the population to be served. It should consist of several acres of well-drained agricultural land, not necessarily productive.

The hatchery itself should consist of a large incubator room on the ground floor of an existing building or possibly in a large well ventilated cave or cellar dug into a hillside. The incubator room should have a masonry or other floor which can be kept in sanitary condition and provided with drainage so that it may be flushed or scrubbed regularly. It should have a ceiling height of 9 or 10 feet and should provide at least 500 square feet of floor space. Storage facilities for equipment, feed, and supplies should be provided in the hatchery building or nearby.

At the hatchery station, but not in the hatchery building, two brooder rooms with at least 300 square feet floor space each and a ceiling height of 5 to 7 feet should be constructed. In one of these rooms, an oil-burning brooder of 250 chick capacity would be set up; in the other, a wood-burning brooder of 250 chick capacity would be placed. Several (at least five) small brooder coops heated with oil lamps, each with a capacity of about 50 chicks, should also be provided. The two large and five small brooders would accommodate at least 750 chickens until they were 8 to 12 weeks old. These would serve as demonstration brooders for the instruction of villagers and their leaders in brooding and poultry management methods. The larger chickens kept in these brooders could be distributed to families who do not have home-breeding facilities.

LOCAL BROODER STATIONS

Since at first only a few peasant families probably can be depended upon successfully to operate individual brooders, local brooding rooms to accommodate about 250 chicks each should be planned for in the local coöperatives in villages where chicks are to be distributed. These brooder rooms should be similar to those described for the central hatchery. When the incubator is in full operation, about 4,000 day-old chicks per week must be moved with the least possible delay from the central hatchery to individual households or to village brooders where they would be brooded until they are 8 to 12 weeks old, when they would be distributed to households where there are no brooding facilities.

If it is found that chicks may be distributed at an age less than 8-12 weeks, contact should be made widely with villagers of the region so that they could undertake construction of brooding facilities in their own homes. Each village family able to do so would be assisted to construct a small lamp-heated brooder. This assistance would include instructing the family in the construction of the brooder and helping the family to obtain the necessary lamp, building materials, and kerosene for fuel. In those villages where a few households are found capable of operating small 50-chick brooders, the burden on the village brooder will be somewhat relieved. In the beginning, however, the village brooder should be depended upon to carry the load of work in developing the 8- to 12-week-old chickens.

LOCAL BREEDING AND HATCHING STATIONS

As the villagers become more skilled in the handling and feeding of chickens, the next step is to organize permanent bases for continued improvement of the poultry industry by establishing regional breeding and hatching stations to distribute improved stock to coöperatives throughout a county or a larger district. The regional breeding and hatching station should be established as far as possible under the auspices of a union of coöperatives or an agricultural school.

The regional station should be organized to include a breeding flock, a demonstration laying flock, the incubation of eggs, the brooding of chicks, the distribution of day-old chicks to affiliated village coöperative breeding establishments and individual member-families, and the distribution of 8- to 12-week-old chickens of superior breeding to families and coöperatives under certain contract conditions.

A breeding flock of about 100 selected bred birds of a standard breed suited to the conditions of the region should be maintained at each station. This flock would be the foundation stock upon which the improvement of the poultry industry of the region would be based. A single breed is preferable to a menagerie of several breeds. About 8 breeding pens would accommodate this breeding flock. Breeding flock matings should be made up in the proportion of one male to about 12 to 15 females.

Each regional station should maintain a demonstration laying flock of commercial size. This flock should be planned to consist of 1,000 to 1,200 birds of the same standard breed and variety as the breeding flock. It would serve as a demonstration of managing layers on a broader basis than household flock management. It also would serve as a continuous

source of eggs of superior quality both for incubation at the station and for distribution to local hatcheries. Appropriate range shelters should be provided at the regional station.

The regional station should eventually have an incubator capacity of about 40,000 eggs, which in certain cases can be obtained by adding a second incubator of 20,000 egg capacity to an already established unit. Under Yugoslavian conditions it probably will be more economical to operate two smaller incubators than one of the mammoth type.

Brooder houses or rooms may of necessity be adaptations of existing structures. The source of heat for the houses might be wood-burning stoves. Brooding capacity should be expanded to provide eventually for handling about 10,000 chickens.

Eggs of healthy native chickens available in a locality should be used for hatching purposes. Only chickens which have passed the tests for pullorum disease (bacillary white diarrhea) should be considered healthy for breeding purposes. The birds which do not pass these tests should be killed for food. The additional hatching eggs needed in excess of those locally available might be obtained from some other station previously established in Yugoslavia or be imported.

After the station is fully organized, the eggs might be obtained from three sources: (1) the purebred stock maintained in the breeding pens of the station; (2) the superior stock of the commercial flock; and (3) improved stock maintained by selected member-families of coöperatives and commercial flocks maintained by village coöperatives. Each family would be under contract to follow instructions received from the station as to the care and feeding of their hatchery supply flocks.

FEEDS MUST BE PROVIDED

Peasant households probably cannot successfully carry out a full feeding regime except in the most advanced communities where abundant feed supplies are available. Provision should be made for a sufficient supply of concentrated feed containing suitable protein, vitamins, and minerals to supplement locally available grain for the growing chickens and laying stock. The amount of feed required would be about 200 pounds (roughly one quintal) of concentrate for each family handling 50 chicks for the growing period, to supplement 600 pounds (three quintals) of grain. If chickens are maintained at village coöperative brooding establishments, proportionate quantities of concentrate and grain feed must be supplied to these establishments. In any case, each co-operating family receiving its quota of 50 chicks would require about

400 pounds (two quintals) of concentrate for the laying flock for the first year to supplement about 1,400 pounds (6.5 quintals) of grain.

Each regional breeding station would require for each 3,000 growing birds, during 8 to 12 weeks, a minimum of about 10,000 pounds (about 4.5 metric tons) of concentrates to supplement 30,000 pounds (about 13 metric tons) of grain and a somewhat greater quantity to maintain 1,200 laying hens for one year.

In time, the production of fish meal on the Dalmatian Coast could be organized and tankage could be produced at slaughter houses. To assure the complete success of this project—that is, well developed young birds and high producing hens—such concentrates must be provided from some source.

Until local people can be found with the necessary experience or trained to take complete charge of this project on a national and regional scale, a certain amount of supervisory personnel might be recruited in the United States or elsewhere. One or more young Yugoslavs with special interest in and aptitude for poultry husbandry might be sent to the United States (or Great Britain) for intensive training in practical poultry management.

Each regional hatching station should have the following Yugoslavian personnel, preferably resident in and native to the community which the station is to serve: (1) one incubator operator and breeding flock supervisor to be trained in the operation and management of the incubator and in pullorum-eradication technique; (2) one breeding and laying flock supervisor to be trained in the brooding, feeding, and management of growing and laying stock; (3) one poultry caretaker at the regional hatching station.

The resident local technicians would (1) operate a demonstration flock at the regional hatching station, (2) assemble and incubate hatching eggs and distribute chicks from the native flocks, (3) control and eradicate pullorum from the native flocks, (4) demonstrate to the co-operating peasants methods of feeding and managing poultry, (5) demonstrate brooder and laying house construction, and (6) organized competitive exhibitions of poultry, etc.

The materials, personnel, and equipment required for one regional station have been described. As many such units as are needed or as may be provided within available funds should be established. The unit described would be expected to serve from 5,000 to 10,000 peasant families. The suggestion has been made that provision be made for at least 100,000 peasant families. This would mean the eventual establishment of at least 10 to 25 such regional hatching stations. The multiplication of

regional hatching units would not entail greatly increased supervisory personnel but would lead to much more economical use of such personnel. If only a very small number of regional hatching stations could be established, the supervisory personnel should be chosen so that they have sufficiently broad qualifications to supervise rehabilitation of other livestock as well as poultry.

The project as set up involves the continuous breeding, hatching, brooding and distribution of improved poultry by a regional station operated by a central or regional coöperative affiliated with a group of local coöperatives. The member-households served by the regional station would number up to 10,000 or more, and the flocks maintained by these households would produce as many as 8 to 10 million eggs per year.

The grading, packing, and marketing of the surplus eggs produced should be handled by coöperatives, appropriately organized to merchandise eggs domestically for urban supply. These local coöperatives should be affiliated with regional and national coöperatives for the export of eggs as well as for the processing and export of egg products. These two systems of coöperatives should be coördinated into a nationwide organization to supply to the poultry industry concentrated feeding stuffs and other materials needed in the management of poultry, including the services of specialists in disease control.

THE MANAGEMENT OF GROWING STOCK

The following discussion on the poultry project gives advice on brooding and rearing chickens, feeding growing chickens and laying hens. Suitable home-made equipment is suggested wherever possible.

For egg and meat production some of the best breeds of chickens to keep include White Leghorns, Rhode Island Reds, New Hampshires, Barred Plymouth Rocks, and White Plymouth Rocks as developed in America and in some European countries before the war. It is important to keep well-bred stock of any of these varieties because their breeding determines to a great extent how fast the chickens grow and how well the pullets lay.

Among the varieties mentioned above, the White Leghorn is the smallest and on the average consumes a little less feed and usually lays somewhat more eggs. It lays a white egg, but is not quite as good a bird for meat as the other varieties. The other four varieties mentioned are all general-purpose birds because they make good table birds and lay well if properly bred. They are all about the same size and lay brown eggs.

BROODING THE CHICKS

Many farmers who have no hatching or brooding facilities will raise a few chickens by the natural method. In such cases the distribution of hatching eggs is desirable.

Depending upon her size, a hen will brood from 12 to 15 chickens successfully early in the season and from 15 to 20 in warm weather. Chicks hatched during the cold weather of winter should be brooded in a house or shed; but after the weather becomes more favorable, they should be brooded outdoors with the use of brood coops to confine the hens. Brood coops should be made so that the chicks can run in and out at will but should be closed at night to keep out cats, rats, and other animals; there should be enough ventilation, however, to give the hen and chicks plenty of fresh air. The construction of brood coops should be such as to permit them to be cleaned easily and disinfected thoroughly. The coop should be moved to fresh ground at least twice a week to prevent the soil from becoming contaminated and to give the hen fresh green feed regularly.

Lamp brooders using kerosene may be home-made or purchased from a manufacturer. A home-made lamp brooder developed primarily for raising small flocks is adapted for those who raise from 25 to 100 chickens, or 4 of these brooders could be used to raise from 300 to 400 chickens in one season. The wick and burner must be cleaned and examined three or four times daily. It is best to locate brooder houses in which lamp brooders are used some distance from other buildings. Wood-burning brooders burning hard green wood give quite satisfactory results. These brooders are economical, especially if wood is readily available on the farm. They must be installed to protect the roof from the chimney to avoid danger of fire.

Best results are usually secured when not over 250 chicks are brooded together, for which a wood-burning brooder with a 52-inch canopy would be desirable. The brooder house should be cleaned thoroughly before the chicks are put into it. Chicks of different ages should not be brooded together, because the younger chicks are very likely not to get sufficient feed and to be trampled by the older ones.

Cover the floor of the brooder house with about 2 inches of straw, shavings, or litter. Peat moss, chopped corn-cobs, or hay may be used. Keep the litter dry at all times in order to avoid spreading disease. Certain diseases, such as coccidiosis, spread more rapidly when the litter becomes wet. The litter around the watering fountains and feed hoppers should by all means be kept as dry as possible. For the first few days, the temperature should be about 95° F. at about 2 inches above the floor.

The temperature should be lowered about 5° each week, depending upon the time of the year and the outside temperature. The main point in brooding is to maintain the temperature that will keep the chicks comfortable at all times. Opening the windows to admit sunlight is a good way to ventilate the brooder house, as well as to help in keeping the litter dry. Sunlight is a powerful disinfectant and is a source of vitamin D, which is necessary for the proper development of the bones of the skeleton.

If the weather is suitable the chicks should be allowed outside in two or three days. Do not raise chickens on land used for poultry the previous year, because land over which poultry has run is likely to become contaminated with eggs of internal parasites and disease organisms.

When a few hundred chicks are to be brooded, a standard-size brooder house seems desirable, especially when the primary objective is the raising of pullets to replace part of the laying stock. The brooder house should provide plenty of room, a minimum of about 50 sq. ft. floor space per 100 chicks being necessary for best results. The colony brooder house, shown in Figure 000 is well adapted to almost any location. It is economical in cost, is easily moved to a fresh site, serves as a summer roosting shelter, and provides light and ventilation.

For the first few days of brooding, the chicks may be fed in shallow boxes or pans. After the chicks are about one week old, small feeders made of metal or wood are usually used to prevent the chicks from getting into the feeder to soil the feed, and prevent waste.

The important point in connection with the watering device is to make sure that it is large enough to keep the chicks supplied with water at all times and to keep the water clean. The watering utensil should be such that the chicks cannot get their feet into the water and spread disease.

Where the land available for brooding chicks is limited and the soil has become contaminated with disease organisms and the eggs of internal parasites, the use of wire-bottomed sun porches attached to the brooder house is strongly recommended. The wire screen sun porch is an outside enclosure next to the brooder house. It is usually about half the area of the floor inside. The bottom is made of 1" x 4" boards set edge-wise and spaced 2 feet apart and is covered with square mesh wire cloth. The floor of the screen sun porch should be placed 10 or 20 inches above the ground, so that the droppings can be removed by a scraper.

REARING CHICKENS ON RANGE

There are probably no substitutes for sunshine and green grass when

it comes to raising chickens. A good grass range provides succulent green feed, reduces the feed bill, and the nutritive value of the grass grown on such range is enriched. Chickens should not be kept on bare ground, especially if filthy water puddles are present.

Provide approximately 100' x 100' of clean range for every hundred chickens and the land should not be used again for at least another year. After the chickens have been removed the land should be limed heavily, ploughed, and sowed to a green crop.

The best type of range shelter is one with an A-shaped or gable roof, that will accommodate about 100 pullets, allowing 1 square foot of floor space per bird. Not more than 100 pullets should be put in one shelter.

FEEDING GROWING CHICKENS

Chicks received from a hatchery are ready for their first feeding as soon as received. This should consist of a mixture of ground grains, limestone and protein concentrates, called the "starting mash." It is scattered on cardboard or paper spread over the floor of the brooder house. Water must be provided from the start in shallow pans. During the first few days, the chicks should have plenty of feed and liquid.

The most common practice of feeding growing chickens is by the combination method of mash in hoppers and scratch grain in the litter. Where homegrown grains are available on the farm, this method of feeding may cost somewhat less than the all-mash diet, especially after the chicks are 10 to 12 weeks old and the protein content of the diet can be reduced.

Corn must be cracked, of course, for young growing chicks. Fairly finely cracked corn and cracked wheat may be fed when the chickens are 2 weeks old, and coarsely cracked corn and whole wheat may be fed when the chickens are about 8 weeks old. Whole corn, oats, and barley may be fed when the chickens are about half grown. It is common practice to feed the scratch-grain portion of the diet the first thing in the morning and the last thing in the evening, giving about one-third of the total scratch grain in the morning and two-thirds in the evening. If the scratch grain is fed on the ground to chickens on range, avoid feeding on the same area day after day; otherwise the grass is soon destroyed, and the ground becomes contaminated with droppings.

Enough hopper feeding space, so that all the chicks may secure feed whenever they are hungry, is necessary. Mash hoppers from which chickens can secure feed from both sides are best.

It is very important to provide plenty of water fountains for the simple

reason that chickens can go longer without feed than without water. Receptacles for water and milk should be large enough to hold a reasonable supply, not easy to upset, convenient for the chickens to drink from yet prevent them from getting their feet into the liquid. The liquid containers should provide at least 1 quart of liquid daily for every 30 chickens during the first 2 weeks, 1 quart for 15 birds from 3 to 6 weeks, 1 quart for every 8 birds from 7 to 10 weeks, and 1 quart for every 6 birds after the tenth week.

FEED MIXTURES FOR CHICKENS

	No. 1		No. 2	
	<i>Mash for chickens in confinement, pounds</i>	<i>Mash for chickens on range, pounds</i>	<i>Starting mash, pounds</i>	<i>Growing mash, pounds</i>
Ground yellow corn	26.0	31.0	30.8	30.4
Pulverized whole oats	30.0	30.0		
Ground whole oats or ground barley			10.0	10.0
Wheat bran	10.0	10.0	15.0	17.5
White shorts	10.0	10.0		
Standard middlings			15.0	15.0
Alfalfa-leaf meal			5.0	2.5
Soybean-oil meal or corn glu- ten meal	5.0	5.0		
Alfalfa Meal	5.0			
Soybean-oil meal			5.0	8.7
Dried skim milk	8.0	8.0	7.5	3.8
Meat scraps (50 per cent pro- tein)			6.0	6.0
Meat and bone meal	5.0	5.0		
Fish meal			2.5	2.5
Limestone or oyster shell			2.5	2.5
Salt	1.0	1.0	0.5	0.5
Dicalcium phosphate				0.5
Straight cod-liver oil or sar- dine oil	1			
Fortified cod-liver oil			0.2	0.1
Manganese sulphate	0.2 oz.		0.2 oz.	0.2 oz.
Total	100.0	100.0	100.0	100.0

FEED MASH FOR GROWING CHICKS

Formulas for different diets have been developed based on the results of research on the nutritional requirements of growing chickens. While it is recognized that all of these feed stuffs will not be obtainable in Yugoslavia at once, sources can be developed as the poultry industry is organized. The two formulas given here should serve as a guide to poultry raisers as to what constitutes a good diet. In case of each mash formula given, the total quantity of feed amounts to approximately 100 pounds so that the amount of each ingredient represents the percentage or the number of pounds of that ingredient in 100 pounds of mash. If one ton of mash is to be fixed, the amount of each ingredient in the formulas should be multiplied by 20.

For those who do not have scales for weighing food, the following information on weights of different feedstuffs may be useful: 1 quart of shelled corn (56 pounds per bushel) weighs 1.7 pound; 1 quart of wheat (60 pounds per bushel) weighs 1.9 pound; 1 quart of oats (36 pounds per bushel) weighs 1.1 pound; 1 quart of barley (48 pounds per bushel) weighs about 1.5 pound; 1 quart of mash weighs about 1 pound.

When either of the No. 1 mash formulas is used, it is recommended that, beginning at 7 or 8 weeks, a trough of whole oats and a trough of cracked or whole corn be fed in addition to the mash. The amount of oats and corn is increased as the chickens increase in size.

The No. 2 starting mash is fed for the first 6 or 8 weeks, after which gradually increasing quantities of scratch grain are fed, or the growing mash and scratch grain are fed. The feeding of a scratch grain is gradually increased until at about 5 months the birds are consuming about twice as much scratch feed as mash.

It is well to remember that the growth of chickens is influenced to some extent by the relative amounts of the scratch mixture that are consumed. Growing mashes contain relatively more protein than scratch mixtures. The higher the proportion of mash consumed and the lower the proportion of scratch mixture consumed the faster the growth.

When the cockerels in the flock are to be sold as meat, they should be separated from the pullets not later than 8 weeks and kept on a fast-growing diet; that is, they should consume much more mash than scratch mixture. The pullets should be fed increasing amounts of scratch mixture until at about 16 weeks they are consuming approximately equal parts of mash and scratch mixture and at about 20 weeks practically twice as much scratch mixture as mash.

FEEDING THE LAYING HENS

When the pullets are moved to the laying houses cover the floor with clean, dry litter, and keep the house thoroughly ventilated. Laying hens are sensitive to sudden changes in feeding and management, especially during the winter months. If they are well fed and properly managed for 6 days but neglected on the seventh day, the results in egg production will probably be reflected in the one day's neglect. If the mash hoppers are allowed to become empty, the decreased feed consumption may cause the birds to lose weight, and molting may take place. If this takes place, egg production is bound to drop. If the water containers are allowed to become dry, egg production is certain to suffer.

When pullets are moved from the range to the laying house, fresh green feed should be fed for about 2 weeks. Sometimes when pullets are moved to new quarters, feed consumption declines. In order to avoid this possibility, some flock owners feed a mash moistened to a crumbly state with water at the rate of 3 pounds per 100 birds. Such a mixture tends to stimulate the appetite, increase feed consumption, and prevent loss in body weight.

Mashes are best when fed in open-type or in so-called "self-feeding" hoppers, the former being preferable. Since it is important to feed freshly ground mashes regularly, the hoppers should have a relatively small capacity but should provide ample feeding space for the birds, made so that the birds can eat from both sides of the hopper. Layers are inclined to eat mash more freely if the hoppers are low enough so that the birds can eat while standing on the floor, as compared with hoppers up to which the birds have to jump. Hoppers for oyster shells also may be of the self-feeding type.

Laying hens in good production consume about 18 to 20 gallons of water per bird yearly, general-purpose birds consuming about one gallon annually more than Leghorns. In other words, a laying hen consumes about one quart of water per pound of feed. The daily requirements of 10 layers amounts to about 0.6 gallons, allowing for some wastage. Keep the water containers in strictly sanitary condition at all times, because filthy water is frequently a source of spreading disease.

FEED MIXTURES FOR LAYING HENS

The following diets are recommended for feeding laying hens by the mash-and-scratch method. In the case of diets containing cod-liver oil or fish oil, the amount given is for winter feeding, smaller quantities being required for summer feeding.

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<i>Diet No. 1</i>	<i>Lbs.</i>	<i>Diet No. 2</i>	<i>Lbs.</i>
Yellow cornmeal	22.0	Ground barley	29.0
Rice bran or wheat bran	15.0	Wheat bran	15.0
Rice polish or wheat shorts	15.0	Flour middlings	15.0
Shrimp bran or meat scraps	12.0	Ground oats	14.0
Pulverized oats	10.0	Meat scraps	10.0
Soybean-oil meal or cottonseed meal	10.0	Alfalfa meal	8.0
Dried skim milk	5.0	Dried skim milk	5.0
Alfalfa-leaf meal	5.0	Fish meal (vacuum dried)	3.0
Oyster-shell flour	3.0	Ground limestone	1.0
Steamed bone meal	2.0	Steamed bone meal	1.0
Cod-liver oil	1.0	Salt	1.0
		Fish oil (400 D)	0.5
Total	100.0	Total	102.5
Cracked corn	40.0	Yellow corn	50.0
Wheat	30.0	Wheat	50.0
Rice	30.0		
Total	100.0	Total	100.0

<i>Diet No. 3</i>		<i>Diet No. 4</i>	
Yellow cornmeal	31.0	Mill run	35.0
Shorts	20.0	Ground wheat or middlings	15.0
Bran	10.0	Ground yellow corn	10.0
Pulverized barley or oats	10.0	Ground heavy oats	8.2
Alfalfa meal (17 per cent protein plus)	10.0	Ground barley	5.0
Meat scraps (55 per cent protein)	5.0	Fish meal (70 per cent pro- tein)	8.2
Fish meal (65 per cent pro- tein)	5.0	Meat scraps (50 per cent protein)	7.5
Dried buttermilk	5.0	Soybean meal	5.0
Oyster shell or limestone	2.0	Dehydrated alfalfa	5.0
Fine salt	1.0	Ground oyster shell or limestone	2.5
Fish oil	1.0	Bone meal	2.6
		Salt	1.0
Total	100.0	Fish oil (400 D)	0.5
Yellow corn	25.0	Total	100.5
Wheat	50.0	Wheat	50.0
Oats	25.0	Oats	50.0
Total	100.0	Total	100.0

It is very important to utilize locally produced feeds as far as possible in the diets given. Peanut, sesame, corn gluten meal, hemp seed meal, or soybean meal may be substituted for most of the milk, fish, or meat meal. Soybean meal is the best of these substitute materials from the standpoint of poultry nutrition. The following table shows how these substitutions can be made with soybean meal. The other vegetable protein concentrates can be used in a similar manner depending on their protein content.

SUGGESTED SUBSTITUTES FOR FISH MEAL, MEAT SCRAP,
DRIED SKIM MILK, AND ALFALFA MEAL.

<i>Ingredient</i>	<i>Substitute for—</i>			
	<i>Fish</i>	<i>Meat</i>	<i>Dried</i>	<i>Alfalfa</i>
	<i>meal</i>	<i>scrap</i>	<i>skim</i>	<i>meal</i>
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Soybean meal	87.0	75.0	50.0	25.0
Corn gluten meal	—	—	—	25.0
Steamed bonemeal	5.0	13.0	—	—
Dried distillers' solubles* or				
dried whey	6.0	10.0	50.0	50.0
Salt	2.0	2.0	—	—
Total	100.0	100.0	100.0	†100.0
Quantity required to replace 1 pound of fish meal, meat scrap, or dried skim milk and enough ground grain to keep unchanged the total weight of the feed mixture in which the substitution is made‡	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
	2.5	2.0	2.0	1.0

*Or other fermentation product or byproduct that contains at least 9,000 micrograms of riboflavin per pound.

†Any feed mixture in which this substitute for alfalfa meal is used should contain vitamin A from fish oil or fish-liver oil.

‡Thus, for example, 2.5 pounds of the substitute for fish meal will replace 1 pound of fish meal and 1.5 pounds of ground grain, but 1 pound of the substitute for alfalfa meal will replace only 1 pound of alfalfa meal.

Best results in egg production can be secured only by following a regular feeding schedule. Laying hens are creatures of habit and soon become accustomed to a regular feeding schedule. Negligence in allowing the water containers or mash hoppers to become empty may result in the loss of body weight, with the result that a partial molt occurs which causes a drop in egg production.

Water containers must be filled the first thing in the morning, and the oyster-shell hoppers frequently enough to make sure that a supply is constantly available.

A light feeding of scratch mixture, about 3 or 4 pounds per 100 birds, may be scattered in clean litter first thing in the morning. During the summer months a light feeding of moistened mash may be fed at noon, and at the same time fresh green feed may also be fed at the rate of 4 pounds per 100 birds. If the yolk color of the eggs is too dark, reduce the amount of fresh green feed.

Late in the afternoon another feeding of scratch mixture in troughs or open hoppers may be given the amount to be fed depending upon the body weight of the birds and the rate of production. The amount fed may vary from about 7 to about 12 pounds per 100 birds. Adjust the feeding of the mash-and-scratch portions of the diet so that approximately equal parts of each are consumed, except that when egg production is at its peak, probably about 60 per cent of the diet should be mash and 40 per cent scratch.

The principal reason why it is important to develop the poultry industry of Yugoslavia is because chickens convert feedstuffs into eggs and poultry meat very efficiently, especially if they are grown from well-bred stock and are well fed and managed. From about 12 weeks after chicks are hatched poultry meat is available and within about five months eggs are available. Developing the poultry industry of Yugoslavia is very important, therefore, from the standpoint of producing nutritious food for all of the people and from the standpoint of increasing the income of farmers and peasants. Eggs and poultry meat rank high in nutritive value and supply protein so important in a balanced diet. They are rich in vitamins and form an excellent food for growing children.

A MILK PRODUCTION PROGRAM

THE two principal reasons why plans for the post-war reconstruction of Yugoslavia should include the expansion of the dairy industry are: First, the increased consumption of dairy products is necessary to im-

prove the health of the Yugoslav people; and, Second, dairying can contribute greatly to the income and prosperity of many rural areas. The climate, soil and natural conditions of many areas in Yugoslavia are adapted to the production of desirable food supplies for dairy cattle. Every farm should have an ample supply of milk and dairy products for all who live on it and every farm that is adapted to commercial dairying should contribute to the supply of milk and dairy products for the population in cities and towns.

Successful dairying is dependent in large part upon the use of dairy cows of high productive quality. It is through the use of good breeding practices, and the use of dairy sires bred from foundation stock of proved producing ability, that improvement in the milk producing qualities of the dairy cattle can be obtained. It is often said that "the sire is more than half the herd," for his characteristics, whether good or poor, are transmitted to the offspring of the entire herd, while the characteristics of each cow can only be transmitted to her own off-spring.

The improvement of the dairy industry in Yugoslavia will be a long-time project. Most of the cows kept in the past have been of the dual-purpose type which, on the small farms, have been used as work animals and finally killed for meat. Good dairy bulls were very scarce except in a few localities. There were practically no sanitary milk producing dairies for the larger cities. The losses of cattle have been great and some time will be required to replace them even if considerable numbers are imported. The problem will require the development of breeding centers such as are proposed for beef cattle in another chapter in this book. Replacements cannot be made so quickly as with poultry and swine.

The most practical way to utilize the best dairy bulls to the maximum is through artificial breeding. Breeding centers for dairy cattle could be established on a plan similar to those of the artificial breeding associations operating in the United States. At each center sufficient bulls could be kept to provide breeding service for the cows in adjoining areas. These breeding centers in the United States were established by the dairymen on a coöperative basis assisted by the Government.

In the United States some artificial breeding associations are breeding as many as 700 to 900 cows a year from a single bull. Such centers offer the best and most rapid means of utilizing the outstanding bulls to improve the dairy cattle of the area.

Such breeding centers operate in the following manner: the bulls are housed at the breeding center and are under the care and management of a bull keeper or caretaker. Semen is collected at the breeding center, packaged and sent to technicians located in various sections of the area

diluted, packaged and sent to technicians located in various sections of the area to be served. The technicians take the semen specimen and visit those farms where cows are to be inseminated.

Sanitary methods of producing, processing, manufacturing, and distributing milk and dairy products are absolutely necessary. Unless sanitary methods are employed, a high quality product, safe for use as a food, can not be produced. Milk is a product which will spoil very quickly if it is not produced and handled under proper sanitary conditions. It is also a carrier of disease if not safeguarded by control of the health of the animals and the methods of handling.

DISTRIBUTION OF MILK

In the distribution of milk in cities and towns, there is a great need for improving the quality of the milk supply as well as for increasing the supply. During past years, the limited city milk supply has consisted almost entirely of fresh raw milk that is delivered in open cans directly from the producer to the consumer. The quality and condition of the milk when delivered has been such that it has been necessary for the consumer to "boil" the milk in order to keep it sweet and make it safe for household use. Such conditions are likely to continue until effort is made to improve the quality of the general milk supply or until the milk is "pasteurized" by milk distribution plants. The improvement of quality and the pasteurization of the milk will increase the general consumption of milk among the town and city people.

In all European countries it has been found necessary to have the milk supply safeguarded by official sanitary inspection and the enforcement of a sanitary code for the handling, processing, and distribution. Sanitary codes have generally discouraged the distribution of milk by bulk methods in tin cans except from the farms to the city milk plant and by the plant to institutional trade such as bakeries, restaurants and other places which purchase milk in wholesale quantities.

SANITARY MILK CODES

In America the necessity of public health control of the milk supplies distributed in towns and cities is considered of such importance that the United States Public Health Service, has prepared in coöperation with the United States Department of Agriculture, and recommended a "Milk Ordinance and Code" for adoption by States, municipalities, counties, cities, towns, or health districts.

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A "short form" of ordinance in one page provides the local health officer with authority to regulate the production, transportation, processing, handling, sampling, examination, grading, labeling, regrading, and sale of milk and milk products; the inspection of dairy herds, dairies and milk plants; the issuing and revocation of permits to milk producers and distributors; the placarding of restaurants and other establishments serving milk or milk products; and the fixing of penalties in accordance with regulations adopted by the local health officer himself or by the local board of health. It provides that no milk or milk products shall be sold to the final consumer, or to restaurants, soda fountains, grocery stores or similar establishments after a specified date except those of the grades set forth in the ordinance.

Most cities of America having a population of more than 5,000 have adopted some form of milk ordinance. The result has been that the quality of milk has been so greatly improved that rarely is there any question raised in any city with respect to the healthfulness of the milk sold or served to consumers. Milk producers have so greatly improved the conditions under which milk is produced that most dairies supplying milk to city consumers or to milk plants have modern stables and milk houses. Cows infected with tuberculosis have been completely removed from the dairy herds so that the occurrence of disease in the dairy herds has been lessened and the possibilities of infection in milk have been greatly reduced. The resulting improvement in the quality of milk has encouraged consumers in cities and towns to increase their demand for milk and to pay willingly a higher price for it.

The establishment and operation of market milk plants in cities, especially those having a population of 10,000 or more, is essential from the standpoint of both producers and consumers. Such plants afford the dairy farmers a permanent and continuous market for all the milk they produce, since the surplus, if any, can be converted by the plants into manufactured products. The milk is either delivered by the producers to the plant or it is collected by trucks visiting from the producers' farms.

At the plant the milk is pasteurized, cooled and bottled for delivery direct to consumers' homes or to retail stores. Whether it is held in storage rooms for later delivery or is delivered immediately, the milk is kept cold after pasteurization until it reaches its final destination.

It is desirable to consider the possibilities of establishing coöperative milk plans in Yugoslavia. A large proportion of consumers and most farmers in Yugoslavia believe in and are familiar with coöperative methods of operation. Government aid in developing a fresh-milk industry for the cities will doubtless be necessary at the outset. Such aid might

well be given to the coöperative organization which would take up the work of introducing dairy-type animals, securing feed supplies, providing for collecting the milk from the farmers and distributing it in the cities. Expert direction is essential and must be provided by funds from an agency that can support the project over a number of years.

A government bureau of dairy industry is almost an essential to co-ordinate and promote farm production and city consumption, provide the sanitary regulation and control livestock diseases. Suggestions for a disease control plan are presented in another chapter in this book. Training in dairy science must be provided in the universities and agricultural schools to train young men and women for the expansion of the dairy industry. The education of producers must go hand in hand with the development of a wider market for milk as a food.

The graduates of the dairy departments of the universities should not only be skilled in the conduct of research and educational work in the broad field of dairying, but should be trained in the practical operation of dairy farms, and dairy products processing and manufacturing plants. They should be able to teach and demonstrate better methods and practices of dairy farming as well as better methods of processing, manufacturing, marketing, and distributing dairy products. They should have an appreciation and understanding of the public health aspects of the dairy industry.

The universities must serve as centers for the collection and dissemination of current information regarding all new dairy industry developments, including improvement in methods and practices in other countries.

Equally important with the teaching and research work at the universities would be the service that could be rendered through the conduct of dairy extension work by the staff of the dairy department. Such extension work may consist of coöperative demonstrations with individual farmers in growing new kinds of feed crops, and in planning crop rotation so as to provide more pasture, silage, and other feed rations. Dairy herd improvement clubs may be organized among groups of farmers. Improved dairy type bulls can be obtained for coöperative ownership and use of club members. Club meetings can be arranged for the discussion of various phases of dairy farming. Special short courses of two weeks or longer may be offered at the universities or at other places for the benefit of plant superintendents and employees who are unable to attend the regular courses at the universities.

THE IMPROVEMENT OF BEEF CATTLE

THE raising of cattle was a primary occupation in many parts of Yugoslavia before the war. The total cattle population has been about four million, and conditions indicate that many more animals could be raised profitably. It is possible that in a few years Yugoslavia can produce enough cattle to provide her own people with a liberal meat diet, and also supply foreign markets.

Four years of war have greatly reduced the beef cattle, so that the number of remaining animals is far below the needs of the country. In parts of the country beef cattle were wiped out altogether. Bringing the amount of cattle to the pre-war figures presents a slow and difficult problem, but extending the cattle industry to what is needed requires even more effort. Farmers and associations of farmers must plan carefully if the number of beef animals is to be increased to numbers which seem profitable for Yugoslavia as a whole.

The following materials, gathered from the experience of cattle raisers in the United States, may prove helpful to those who believe that raising beef cattle may be profitable for the farms of their communities.

Cattle raising is an industry suited to many sorts of conditions. Cattle may be raised profitably on a large scale in areas where the land is too poor for cultivation, and also where most of the land is utilized for cereal crops. There are some parts of Yugoslavia where cattle have been raised successfully for hundreds of years, and others where they have not been used at all. In both cases, it is wise to consider carefully the resources of the community, to see whether it will support cattle, and if so, what numbers and type of cattle are most suitable.

THE FEED SUPPLY

The most important consideration is the supply of food. There are two general practices followed in feeding cattle in the United States: fattening on grass, and fattening in feed-lots. To fatten cattle on grass it is first necessary to have an extent of good pasture land. Pasture soil is usually too poor for cultivation but rich enough to support a cover of edible grass, brush, and trees. Cattle graze best on gently rolling land where both short and coarse grasses predominate, but they can be grazed on ranges that are mostly wooded or covered with brush and browse plants. It is not the terrain that is most important, but the condition of the land. Over-grazing and soil erosion have ruined many areas which were once good pasture.

The condition of the land determines the number and kind of animals



the land will support. Grazing land in good condition can support from fifty to seventy-five head of cattle for every one-hundred hectares (2.47 acres to an hectare) of land. Grazing land that offers poor forage, or which is losing its fertility, should be grazed very lightly, with less than ten animals on every hundred hectares. Light grazing lets the animals obtain enough food and also gives the range a chance to revegetate.

The feed-lot method is best adapted to areas where most of the land is devoted to grain. In such regions there is likely to be a surplus of grain—a surplus that becomes marketable when turned into beef. Cattle fed by this method are usually of higher quality and command good market prices. Whether or not feed-lot fattening is practical can be judged by the amount and price of available feed. A steer weighing three-hundred kilograms requires in a year 1,500 kilograms of legume hay and 3,250 kilograms of corn (or substitutes for these). Unless this much food can be provided for every steer, it is not economical to raise cattle in a grain country.

A community which is to raise beef cattle profitably must have access to markets where there is a demand for beef. The availability of markets determines whether it is practical to raise as much beef as the land will support. If without good markets, a community should not raise more cattle than can be consumed within the community itself.

There are many areas in Yugoslavia where pasturage is limited and markets not easily accessible. Communities in such areas cannot practically raise cattle in large numbers, but individual farmers or groups of farmers may very well support a small herd. There are often small patches of land which cannot be cultivated but which offer grazing opportunities to a few animals.

Because cattle can be raised more economically in large herds than in small numbers, a coöperative organization of farmers seems the most practical way of operating the small herds. Pasture lands may be pooled, and buildings and equipment owned and used coöperatively. The choice of breed depends both on the use to be made of the animals and the adaptability of a given breed to the climate and topography of the district.

In areas, particularly in the cereal producing districts, where the cattle are fattened primarily for market, the beef breeds will probably be the most profitable. Where cattle are intended as much for meat within the community as for sale on central markets, the dual-purpose breeds, through the sale of the milk and dairy products, may provide higher income for the farmers or farm coöperative, as well as increase the food supply of the community. It would seem that the dual-purpose breeds should be very useful for the majority of Yugoslavian communities.

CHOOSING THE BREED FOR IMPROVEMENT

Some breeds have proved to be well-adapted to cold, rainy areas where the vegetation is sparse; others thrive in hot climates where some cattle would perish. If a particular breed of cattle has been raised in a given part of the country before, that breed is probably better adapted to the particular climate and good conditions of the region than any other breed. It would be wise to use that breed as the backbone of the herd, provided it is a good breed for the intended purposes. Because of the effects of the war, it is possible that there are not enough animals left in Yugoslavia even to start new herds. In many cases it will be necessary to import cattle, possibly from Switzerland, England, Argentina, and the United States, where the supply has not been greatly diminished. If this is done, it is wise to select the breed very carefully, for imported cattle often do not thrive in a strange environment. It is also important to choose a breed which crosses well with other native breeds.

If the local breed does not have the characteristics of beef or dual-purpose cattle, it will be profitable in the long run to import enough animals to start a good beef herd than to try to develop a herd from poor animals. The most important animal is the herd bull, for his characteristics are reflected in all the calves. In choosing bulls it is important to select if possible those with good breeding records. In selecting the cows it is not necessary to put so much stress on quality, although of course a superior cow should deliver better calves. With a good bull it is possible to produce good calves even with fair quantity dams. In order to obtain a large crop of calves for quick replacement, it may be practical to use as many breeding cows as possible, even if many are of rather low grade, rather than to use fewer and better grade dams.

BREEDING ESSENTIALS

Through careful breeding, over a period of years a good herd can be developed from inferior stock by the use of good bulls. The primary consideration is to mate animals which will compensate for each other's bad qualities. The best time for calves to be dropped is in the early summer. In many localities the range in early spring and late summer does not support a cow and her calf, and winter calves may be lost from the cold. It is best to breed the cows in August, September, and October. The calves will then be born between April 15 and July 15. A heifer calf may be bred at the age of two years, although with small undernourished animals it is best to wait another year. Cows may be bred two and a half or three months after the birth of their calves.

If calving time is to be controlled, the bulls must be kept separate from the cows for the greater part of the year. A bull needs exercise, and should not be kept continually tied in a barn. He may be turned into a special pasture, or kept with pregnant cows over the winter. About thirty days before the beginning of the breeding season, a bull which is fed on pasture should be put on an extra ration of grain and protein, two or three kilograms of grain and one-half kilogram of protein. This ration should be continued throughout the breeding season. A bull which is fed in a feed lot requires only an additional protein ration at this time.

Under normal conditions, on good growing pasture, breeding cows do not require supplemental food. If they are being milked, however, they show better returns if they are fed grain every day, at the rate of one kilogram for every gallon of milk they give. In order to develop healthy calves, pregnant cows due to calve in the spring require a generous food ration over the winter. Rations which have been used successfully for pregnant cows in the United States are as follows:

<i>Kind of Feed</i>	<i>Kgs. per day</i>	<i>Kind of Feed</i>	<i>Kgs. per day</i>
1.		4.	
Corn or sorgo silage	17	Corn silage	17
Legume hay	3	Mixed hay	5
		Cottonseed meal*	1½
2.		5.	
Corn fodder	8	Corn silage	13
Mixed hay	5	Soybean hay	4
Straw	1	Wheat straw	1½
3.		6.	
Soybean or sorghum si-		Clover or alfalfa hay	8
lage	17	Straw	5
Straw or cottonseed hulls	5	Cottonseed cake*	1½
Cottonseed meal*	¾		

*Linseed meal, soybean meal, or similar concentrates may be fed in the same proportions if more readily available.

In many cases pregnant cows also require a mineral supplement, which is necessary to provide a strong bone structure for the calf. A mixture of five parts by weight of ground limestone with five parts of bonemeal should be satisfactory, if fed at the rate of one kilogram a month for

every animal. Salt, at the same rate, should be accessible at all times.

Previous to the time of calving the ration should be reduced, especially the bulky part of it, and made more laxative. Wheat bran, oats, and linseed meal have been used for this purpose. If the cow is on good pasture, no special attention need be given her diet.

FATTENING BEEF CATTLE

Cattle require two different kinds of feeds: concentrates and roughages. The concentrates in cattle diets frequently are lacking in protein, which is needed for the animals to develop the muscle tissue which is so important for meat. Protein is supplied in such foods as soybean meal 50%, cottonseed meal 35%, linseed meal 35%, wheat and rice bran 15%, and legume and alfalfa hay 15%. Whatever practice is followed in feeding cattle, the supply of protein is an important factor.

Two general practices have developed in fattening beef cattle for market. Whether one or the other is more practical depends on the conditions under which the animals are raised as well as on the results desired.

The older method is to fatten steers so that they will be ready for market at the age of four to six years. At that time they weigh well over 500 kilograms. The newer practice is to feed suckling calves extra grain rations, and to put them on a regular fattening diet of grain soon after they are weaned, so that they are ready for market within a year.

In areas where grain is plentiful, the second method, called "creep-feeding" the calves, has been most popular. Young animals make the most efficient use of grain. Because they develop more weight for every kilogram of grain than do older animals, the percentage return from grain-fattened young animals is greater than that for older animals fed on grain. Three and four-year-olds require more grain for each kilogram of total weight than do younger cattle.

Where forage, hay and roughage are in abundance, and grain is expensive, it is usually more economical to carry the animals to older ages. Although calves make the best use of grain, older steers can utilize a much higher percentage of roughage. Therefore, it costs less to feed them as they grow older. The lower the cost of feeding an animal in proportion to the market value of his carcass, the greater is the profit.

Cattle on good pasture will do well with no extra feed, but in many instances it has been proved more profitable to give them a supplemental ration of grain and protein. The increase in their market value usually more than compensates for the cost of the grain. On widely-distributed ranges, supplementary feeding is not practical,

A good beef animal should weigh over three hundred kilograms at the end of the first year, and gain at least one hundred kilograms every year after that.

The following table suggests supplementary rations for animals on pasture of medium grade:

	<i>Grain</i>	<i>Protein</i>	<i>Days</i>
2-year-old steers	4 Kgs.	½ Kgs.	120
	6 “	0 “	120
yearling steers	3 “	¾ “	140
	4 “	½ “	140
creep-fed calves	2 “	½ “	200

The grain is usually placed in self-feeders in scattered parts of the pasture, and the supply renewed every few days. If the cattle were fed grain through the winter, it is best to provide grain all through the summer. Cattle “roughed” through the winter on silage, and dry roughages, do equally well if they are given the supplement only during the latter half of the summer.

Cattle in feed-lots must have all their feed set before them. The kinds of feed used depend on the varieties that are available in the area. They should be combined to give the percentages of roughage, and concentrates essential to the development of the animals.

Salt, at the rate of one kilogram a month for every animal, should also be provided under any system of feeding.

The following table suggests combinations and amounts which have been used successfully in feed-lots in the United States.

Most cattle fattened in a feed-lot are started on feed as calves immediately following weaning. Cattle fattened on pasture are usually yearlings or two-year-olds.

Cattle also require the minerals salt, calcium, and phosphorous for their development. If leafy legume hay is available, the cattle will usually receive a sufficient amount of calcium and phosphorous. If the cattle cannot be fed legume hay, they should receive a mineral supplement. A mixture of limestone and bone meal, fed at the rate of one kilogram a month, should be satisfactory. Salt, also one kilogram a month, should be kept before the cattle at all times.

Feed-lot cattle intended for market during the winter months are fed the same ration regardless of the season. Animals on pasture, however, may be roughed through the winter on silage, straw, or hay. They will not gain materially in weight, but should remain in good condition

Combinations	Amounts for steers of the indicated weights			
	200 kgs	300 kgs	400 kgs	500 kgs
corn	7	8	9	10
legume hay	3	3½	4½	5
corn	5	7	8	8
protein meal	1	¾	1	1¼
mixed hay	2½	3	4	5
milo, kafir, or barley (ground)	6	6	8	—
protein meal	⅞	1¼	1½	—
sorgo fodder	4	—	—	—
cottonseed hulls	—	5	8	—
corn	—	—	—	9
protein meal	—	—	—	1¼
straw	—	—	—	2½
stover	—	—	—	2½
corn	5	6	7	—
protein meal	⅞	1	1	—
mixed hay	1½	2	2	—
silage	4	5	7	—
corn	5	5	6	8
protein meal	1	¾	1½	1¼
straw or stover	1½	3	1½	2
silage	5	10	10	8
milo, kafir, or barley (ground)	5	8	8	—
protein meal	⅞	1	1	—
grass hay	1½	1½	1½	—
silage	8	8	8	—
corn	—	—	—	8
protein meal	—	—	—	3
silage	—	—	—	13

so that they will gain weight rapidly when put on pasture in the spring. For most animals, five to six kilograms of roughage with one kilogram of protein concentrate per head daily should be sufficient to carry them through the winter. If hay alone is used, eight kilograms of alfalfa or ten kilograms of other hay is a satisfactory ration. A common but wasteful practice is to leave stacks of hay on the range which the animals can eat at will. In mild winters, when the cattle are fat in the fall, good winter range supplemented with about one pound of a protein concentrate should be quite satisfactory. Calves require more liberal rations

for their weight than do older animals, but they may be fed the same kind of feed.

DISEASE AND PEST CONTROL

The largest proportion of cattle losses are due to disease and insect pests. The control of animal diseases and pests is discussed in a following article. The subject will not be discussed in detail here.

The first step in controlling diseases is to have the animals examined by a veterinarian. A second precaution which cuts down losses directly, is to have the animals vaccinated against all diseases found in the region and for which vaccines have proved effective. Dipping vats filled with a solution which kills ticks, lice, and other skin pests are another control device. The cattle are made to swim through the vat, so that they are thoroughly soaked.

Coöperative associations raising beef cattle would be wise to make such a vat part of the common equipment, for losses due to ticks, tick fever, and lice deplete the value of the herd. When the numbers of cattle raised does not warrant the construction of a special vat, the pests may be partially controlled by spraying the animals.

Cattle fattened in the feed-lot are marketed when ever they have achieved the proper amount of flesh. A well "finished" steer has a deep firm layer of fat over his body, particularly over the ribs, back and loin. The state of his finish may be judged by the thickness of fat over the ribs and rumps, and on the brisket (front of chest between the forelegs) which is usually the last part to fill out. When the brisket is well-fleshed, the animal is usually ready for market.

Cattle on ranges and pasture should be marketed when they have attained their highest rate of gain for the year in which they are to be sold, and before they begin to lose weight. In this way the greatest value is obtained from the forage.

A TEN-YEAR PLAN OF CATTLE BREEDING

Central breeding stations, where animals are raised for breeding purposes only, have been used widely in the United States as a means of increasing the numbers of cattle and improving the quality of the animals.

A year by year outline of the activities of a typical station, managed on a ten-year plan by a coöperative association of farmers, is given here. The plan has been modified for adaptation to conditions where it seems best to improve a local breed by importing purebred cattle, and where enough native animals are available to stock the station.

First Year

The first year of the program will be one of preparation. Before the station can be set up, arrangements must be made for securing animals, land, feed, equipment, and personnel. A survey should be made of the available cattle, and the best possible stock selected for use at the station. The relative amounts of pasture land and cattle feed which will be required depend on the practice which is to be followed in feeding the animals. The supply must be sufficient to support the numbers of cattle at the station. During the first year it may be advisable to put as much land as possible into the production of feed and forage crops. Feed-lots, dipping vats, corrals, and shelters may have to be constructed. The management of the station will probably require a permanent director and several helpers.

The coöperative association should spread information about the station to all its members and to other cattlemen in the community. Lectures on improved cattle breeding and disease precautions may be helpful in arousing interest. If individuals in the community select and breed the best of their stock, the cattle in the community should improve rapidly. The increased value of the cattle resulting from breeding the best stock will in the long run more than make up for the slight loss suffered in the first few years from marketing the least desirable animals.

Second Year

Fifty breeding cows or heifers and five bulls are recommended as a convenient base for the herd. These animals should be of the best available native stock, and free from disease. The cows should have been bred the year before, and will drop their calves in the spring. The heifer calves of good quality may be retained as breeders and the bull calves castrated and sold for meat. The cows should be bred in the summer to the station bulls, so that their calves will be born in the spring of the third year.

The services of the station bulls should be offered free of charge to farmers in the community, who should be encouraged to take their own less desirable bulls out of service. Farmers should be permitted to bring only healthy cattle to the station for service.

At the end of the second year, there should be at the station cattle numbers approximately as follows:

Females: 50 cows of breeding age and 17 native calves.

Males: 5 bulls and 17 native calves.

These numbers will vary, as some of the fifty original cows may not

have been bred, and some may be heifers due to be bred in the summer. Also, the 70 per cent of the calf crop which normally would grow into healthy mature animals may not all be of good enough quality to be retained in the herd.

Third Year

Five pure-bred bulls should be imported early in the spring of the third year, so that they may have a rest of several months before being put into service in the summer. The breed selected should be one which seems best adapted to the needs and conditions of the community. It is desirable to develop only one breed or type at a station.

The cows bred the previous spring will drop their calves during the summer. The heifer calves should be retained for future use as breeders, and the bullocks sold as feeders or fattened at the station. Three of the native bulls should be disposed of, and the fifty cows at the station bred to pure-bred bulls. Two native bulls may be retained for use with cows from outside herds.

At the end of the third year, the station should have approximately:

Females: 50 native cows, 17 native yearlings, and 17 native calves.

Males: 2 native bulls, 5 pure-bred bulls and 17 native calves.

Fourth Year

During the spring the native cows, which were bred the previous summer to the purebred bulls, will drop *grade* calves (from purebred sires and native dams). All of the heifers and seven of the bulls should be retained as breeders, and the remaining bulls sold or fattened for market. The two native bulls of the previous year may be kept for use with farmer's cows. The fifty original cows and the two-year olds from the first crop of cows should be bred to the purebred bulls.

At the end of the fourth year, there should be:

Females: 50 native cows, 17 native two-year olds, 17 native yearlings and 17 grade calves.

Males: 2 native bulls, 5 purebred bulls and 17 grade calves.

Fifth Year

At this time it may be advisable to start a small purebred herd. Ten purebred two-year-old heifers may be imported in the spring, and bred in the summer to the purebred bulls. Three new purebred bulls will be needed also, and the remaining two native bulls may be sold. The original native cows, and the first and second crop of calves, now two and

three years old, should also be bred to the purebred bulls. Free service to the farmers should be continued, using the purebred bulls.

At the end of the fifth year, there should be:

Females: 67 native three-year-olds and over, 17 native two-year-olds, 17 grade yearlings and 17 grade calves.

Males: 8 purebred bulls, 7 grade yearlings, 10 grade calves (the rest sold).

Sixth to Tenth Years

The native cows (the original fifty cows), and those sired by native bulls may be disposed of, leaving only purebred and grade cows and heifers to be bred to the purebred bulls. By the tenth year the grade animals will have approached the conformation of the purebreds, and the herd will be relatively homogeneous.

The breeding process should be continued, retaining all the heifers for breeding. The grade bull calves (from native and grade dams) should be sold as two-year-olds for breed bulls or fattened for beef. Half of the purebred bull calves should be kept at the station for breeding, and half sold as breed bulls.

Close inbreeding in the purebred and grade herd should be avoided. It is practical every two or three years to exchange the bulls for others of the same breed from another station.

By the tenth year, approximately six hundred and fifty calves of good quality should have been produced during the operation of the station, allowing for no loss from disease or accident. The quality of the calves raised by the farmers in the locality who have used the station bulls will also have greatly improved.

A PROGRAM FOR THE IMPROVEMENT OF SHEEP

DURING the five years 1933-37 there was an annual average of more than 9,000,000 sheep on the farms of Yugoslavia and by December, 1939, the total number of sheep in Yugoslavia was estimated to be 10,154,000. Hostilities have since considerably reduced this number. About 90 per cent of these sheep were in the regions south of the Danube and Sava rivers. They are almost exclusively of primitive, unimproved, coarse-wool breeding, kept primarily for milk production. There are very few large commercial flocks. Sheep raising in Yugoslavia is a household enterprise which furnishes milk, cheese and mutton which form a large part of the family diet, and wool from which to spin and weave coarse garments.

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In 1940 there were 63 sheep per 100 persons in Yugoslavia, as compared with 40 sheep per 100 persons in the United States. However, the annual fleece weights per sheep in Yugoslavia averaging about 4 pounds provides an annual unscoured wool supply of 2.52 pounds per person, whereas in the United States the annual fleece weights per sheep averaging about 8 pounds provides an annual unscoured wool supply of 3.20 pounds per person. These facts indicate the possibility of increasing the wool supply in Yugoslavia, which could be done by the introduction of rams that are good wool producing sires.

At the end of the first world war sheep of the Oxford, Hampshire, Merino and Karakul breeds were introduced. The Oxfords and Hampshires are useful for increasing fleece weights of medium wool and for mutton improvement, the Merinos for increasing the fine wool supply and the Karakuls are for lambskin fur production. Where the fine-wool sheep have become established it may be well to effect further improvement of them by the introduction of select Merino and Rambouillet rams and by increasing the numbers of such sheep, through breeding, to meet the limited fine-wool needs of that country. In those sections of the country where sheep of the wool types are not of importance any change in local breeds may be unwise because the use of fine-wool sires would seriously reduce the milk production capacity of the ewe offspring. Improvement of the milk sheep could best be accomplished through the use of superior native sires if such sires are still available.

BREEDING PROBLEMS

When Yugoslavia is again free from conflict the desire for increasing the supplies of sheep products such as milk, cheese, butter, mutton and wool may stimulate a need for the importation of ewes as well as rams. The desperate needs of the people may give rise to hasty and promiscuous decisions on the selection of sheep of the desirable types and merits to best meet the needs of the respective communities. Local leaders of understanding and vision should be assigned to this program for rehabilitating the sheep enterprise. They should be on the alert to insure wise action in making maximum use of the native sheep that may still be available, and in making certain that the sheep obtained from the various regions of Yugoslavia, or imported from other countries are of the type best suited to the needs of the locality in which they may be placed and used.

All these sheep produce at least some milk, mutton, and wool, but most of them are specialized in the production of one of these products

and some of them are relatively important for two of these products, as indicated. It may be essential in some cases to use sheep for the production of a certain product for which they may not be specialized, but when possible sheep should be selected for use in the production of the products in which they are specialized and most efficient.

The primary products herein mentioned for the various breeds are in accordance with the best records we have been able to find. In several cases the information about the primary products has been very meager, but such of this information as is herein recorded should serve as a dependable guide in locating breeds, for specific purposes, within reasonable distance from locations in Yugoslavia where they may be needed.

There is a possibility of obtaining sheep in the United States of America for use in rehabilitating the sheep enterprise of Yugoslavia. Most of the improved sheep in the United States are of British, French or Spanish origin although one breed originated in Bokhara, Asia. They have been modified by selective breeding to suit the needs of certain regions of the United States where they are raised. Sheep have not been used for commercial milk production in the United States, but they have been used and improved for the production of lamb meat or mutton, and wool.

The breeds that are most numerous in the United States are Rambouillets, Hampshires, Shropshires and Merinos. These four breeds make up approximately 80 per cent of the improved sheep in the United States according to the census of purebred livestock. In addition to these breeds there may be special interest in Dorset (Dorset Horn) sheep because of the capacity of the ewes of this breed to produce milk in fair abundance although they have been used in the United States for the production of rapid growing lambs instead of milk production as a dairy product. Cheviot sheep may also be of interest because of their vigor and hardiness.

The specimens of sheep of the United States that are likely to be of the greatest interest in Yugoslavia are Rambouillets, Hampshires, Dorsets and Cheviots. Sheep of the Rambouillet breed, as the smooth type without heavy skin folds, are preferred by producers of fine wool especially on western ranges of the United States. However, many good Rambouillet sheep in the United States possess rather heavy skin folds about the neck.

Heavy wool covering over the face often causes the sheep to be wool-blind. The more open faces are free from the wool blindness of smooth Rambouillet sheep and are preferred by producers of fine wool especially on western ranges of the United States. The Hampshire sheep are

very popular for mutton and lamb meat production in the United States.

FEEDING PROBLEMS WITH SHEEP

Sheep are naturally adapted to grazing on pastures and ranges that supply a variety of forage plants. In the process of rehabilitating the sheep enterprise of Yugoslavia it will doubtless be most economical to utilize pasture forage for the maintenance of the sheep insofar as that kind of feed can be made available for this purpose. In winter, and in times of scanty pasture forage, the feeding of the sheep should insofar as possible be managed so as to produce vigorous lambs and keep the wool strong and in good condition. While all the feeds listed may not be available now in Yugoslavia they may be produced or imported later.

Leguminous hays such as clovers, alfalfa, and soy beans make the best forage for sheep. In case they should not be available and it is necessary to feed such non-leguminous roughage as straw or cornstalks it may be essential to feed some protein supplements to maintain the sheep in good condition, especially the ewes, to produce sufficient milk for raising their lambs. The protein supplements may be cottonseed meal, linseed meal, or soybean meal. These feeds may also be fed in the form of compressed cake.

Succulent feeds such as root crops, beets, turnips, etc., and silage, especially corn silage, are desirable when they can be made available without too much expense. Such feeds are especially useful to keep the mother ewes in good health. However, they should be fed with some hay. It is not advisable to feed ewes more than about three pounds of roots or silage per head daily. Turnips should be used sparingly for ewes until after they have lambed.

Each of the following rations contain approximately the quantity of the various nutrients required daily for pregnant ewes weighing 110 to 140 pounds when in the dry lot:

(1)	(3)
3 pounds alfalfa or soybean hay	3½ pounds alfalfa or clover hay
2 pounds corn silage	2 pounds corn silage
½ pound shelled corn	
(2)	(4)
3 pounds alfalfa hay	2 pounds of oat straw
2 pounds corn stover (edible portion)	2 pounds of corn silage
	¾ pound shelled corn
	¼ pound linseed meal

Linseed meal may be replaced with cotton seed meal or with soybean meal. These are only a few rations which may serve as guides to indicate the approximate quantity of feed for proper but economical feeding of pregnant ewes.

In order to keep the rams in strong, healthy condition they may be fed the same kinds of feeds as the ewes but slightly larger quantities depending upon the relative size, appetite, and the condition of the flesh. They need a larger allowance of high-quality feed just before and during the breeding season when pasture is not available. After the breeding season they can be fed less grain and more roughage providing they are in reasonably good condition of flesh and vigor.

Under the conditions of rehabilitation there may be a tendency to stock some pastures very heavily with sheep because of the scarcity of good pastures. If heavy stocking and crowding of the pastures with sheep should be necessary it may be very helpful to feed the sheep phenothiazine in a salt mixture for the control of internal parasites. In fact such feeding of phenothiazine may be essential in pastures of the lower elevations or at any elevation where stomach worms or other internal parasites may endanger the health of the sheep and especially the lambs. During the warm season at least from May to September and in the warmer areas possibly from April to October, salt medicated with phenothiazine should be kept before the sheep and lambs at all times, in troughs that are so sheltered as to protect the phenothiazine-salt mixture from sunshine and weather.

Such medicated salt is prepared by mixing thoroughly nine parts of loose granular salt with one part of phenothiazine by weight. Usually sheep will consume this mixture at the rate of about one-third pound per sheep, per month. It is well to place enough of the mixture in the sheltered trough to last the sheep for a period of two to four weeks, replenishing with a fresh supply at regular intervals so as to keep the mixture available at all times during the warm months.

MANAGEMENT PROBLEMS TO SAVE LAMBS

If lambs are to be born strong and vigorous, a moderate amount of exercise is necessary for the ewes during the winter, or at such times as they are not on pasture. This can be accomplished by feeding some of their roughage at some distance from their shelter. If winter pastures are used, no other arrangement for exercise is necessary. At no time should the pregnant ewes be forced to wade through deep mud or snow, and they should never be chased by dogs nor forced to jump over boards

nor pass through narrow doors, as such treatment is sure to cause loss of lambs or both ewes and lambs.

The lambing season is the shepherds' harvest time, and the size and quality of the crop largely determine the profits. At this time extra attention should be given to the ewes and lambs. If a record of the date of breeding has been kept, the approximate date of lambing can readily be foretold, for the ewes will generally carry their young 145 to 150 days.

Heavy grain feeding of one or two pounds per ewe per day just before lambing should be avoided because it is likely to cause udder troubles. At this time the wool around the udder of the ewe should be clipped short to allow the lamb to find the teats readily. It is helpful to put each lambing ewe in a separate pen and keep her there until she has lambed and she and her lamb know each other thoroughly.

When a lamb is being born if the ewe strains for half an hour without delivering the lamb, aid may then be given by the shepherd. The normal position of the lamb at birth is to have the forelegs extended with the head lying between them. If the lamb is not in proper position the shepherd should correct it by inserting his hand and arm into the vulva and effecting the change. When such assistance is needed the shepherd should first trim his finger nails and thoroughly wash and cleanse his hands and arms. He should then rub vaseline or oil on his hand.

When the position of the lamb is correct it can usually be successfully delivered by looping a string around the front feet and pulling outward and downward as the ewe strains. If the womb and vagina have been lacerated by the operation, it is well to use a solution composed of one-half ounce of zinc sulphate and two ounces of tincture of opium in a quart of water at blood temperature. This should be poured into the womb by means of a rubber tube and funnel. If the ewe seems weak a stimulant should be given.

If the shepherd is present at the birth of a weak lamb, he should wipe away the phlegm or membrane from the nostrils of the lamb, and, if not already broken, the navel cord should be severed. Blowing into the mouth and nostrils and slapping gently on the ribs, first on one side and then on the other, will often save the life of a lamb that is apparently dead.

In cold weather lambs may get chilled and die unless prompt remedies are used. Wrapping the lamb in hot clothes, which are renewed as often as necessary, is an excellent method of warming it. Another method is to place all the body except the head for a few minutes in water, as hot as the hand can bear; then remove, dry with cloths, and wrap up for an hour or two in fresh cloths or a sheepskin to complete the drying process.

In any case milk should be given freely and the lamb returned to the ewe and allowed to suck as quickly as possible. If it does not suck when held to the teat, a nursing bottle with a nipple may be used. A few teaspoonfuls each hour for a few hours will usually give strength to enable the lamb to nurse without assistance.

Little trouble is experienced with disowned lambs where individual lambing pens are used. With a ewe that refuses to own her lamb it is sometimes sufficient to draw some of the milk and rub it upon her nose and also upon the rump of the lamb. A heavy-milking ewe with only one lamb can sometimes be made to adopt an orphan or the disowned lamb of a lighter milking ewe. When there is difficulty in having a ewe adopt another lamb after losing her own, the skin of the dead lamb may be fastened over the lamb to be adopted. This skin should be removed in two or three days, after which no trouble is usually experienced.

If for any reason a lamb is permanently orphaned it may be raised by bottle feeding using whole milk from cows, goats or ewes. Very young lambs should be fed milk from ewes which has also recently lambed, when it is possible to obtain it. For the first two days they should be fed 1 ounce every two hours, after which they can be changed to the milk of cows or goats without difficulty. Milk should always be fed from boiled bottles and at about body temperature, or 100° Fahrenheit (37.8° Centigrade). Care should be taken to feed the lambs frequently and in small quantities. Best results are obtained by feeding every four hours for two or three weeks at the rate per feeding gradually increasing 2 to 6 ounces per lamb. At this age they should be nibbling some hay and grain such as wheat bran, rolled oats, or cracked corn, and the period between feedings can be gradually increased to eight hours, while the amount fed should be increased to one pint.

Constipation is recognized by straining and distress and may be remedied by a teaspoonful of castor oil. White scours can best be cured by giving one-fourth of an ounce of baking soda, 1 ounce of sulphate of magnesia, and a pinch of ginger in a small quantity of flaxseed tea or gruel. This should be followed in about four hours with 2 ounces of linseed oil. Indigestion is shown by distress and frothing at the mouth. A liberal dose of castor oil will effect a cure in most cases.

Sore eyes are of rather common occurrence in newborn lambs. The eyes appear covered with a milky scum, or, in bad cases, become an angry red. In either case tears are apt to flow profusely. An eyewash of silver nitrate or 15 per cent argyrol will clear them up in a few applications. Sore mouths are sometimes caused by scabs around the lips. These scabs should be rubbed off and sheep dip or medium-strength solution of copper sulphate applied.

The shepherd should watch the ewe's udder closely to see that it is in good condition, for good lambs cannot be raised from ewes not milking freely. Ewes that have lambed should be kept in lambing pens from one to three days and then turned in a pen by themselves where they can be given special feed and care. After lambing they should be fed lightly at first, being put on full feed about the third or fourth day. At this time it is economy to feed heavily enough to produce a large flow of milk for the lambs. Heavy-milking ewes can make good use of from 1 to 2 pounds of grain per ewe per day. When ewes are on good pasture it may not be necessary to feed them grain especially if there is no need for extra forcing of the lambs to an early finish and for fancy market.

CONTROL OF EXTERNAL PARASITES

If ticks, lice, and other skin parasites are troubling the sheep it may be essential to dip them in order to free them from external parasites. A convenient time for dipping is shortly after shearing in the spring. Less dip per animal is needed and the weather is usually more favorable at this time than at any other season. The dipping should be done in the morning of a clear, quiet, warm day, so that the sheep will be dry by night and will not catch cold. Every member of the flock should be dipped, and it is well to spray the inside of the sheep stable with dip at this time. If prepared dip solutions are not available a mixture should be prepared by the agent in charge of livestock development. To insure the eradication of sheep ticks the sheep should be dipped a second time about 24 days after the first dipping. About 10 days should be allowed to elapse after shearing, so that shear cuts may have time to heal before dipping.

MANAGEMENT OF WEANED LAMBS

If lambs are intended for the production of meat at weaning time they should be well finished for this purpose and those that are thriving the best should be sufficiently finished at the age of four to five months which is the normal age at which lambs may be weaned. Lambs to be kept for breeding purposes should be weaned at the same age and put on fresh pastures, where there is less danger of stomach worms. When the weaning is done at this time the ewes can be put in best condition for the fall breeding season. Ram lambs left in the flock worry the ewes. When lambs are to be kept on the farm the best method of weaning is to leave them on the old pasture for three or four days and remove the ewes to a

scanty pasture to check their milk flow. As soon as the lambs cease fretting for their mothers they may be moved to fresh pastures where the ewes have not been grazing. Ewes with large udders should be partially milked once every three days until they go dry.

Lambs retained for breeding stock and to be used in the production of milk and wool can be maintained successfully on good pasture or on good legume hay in times when pasture may not be available and without very much feeding of grain or other concentrates. Lambs that are intended for meat production that are not finished and slaughtered at weaning time may require grain along with good forage if they are to be fattened successfully to a finish which would make them satisfactory for meat production. Corn, barley, oats, or sorghum grain may be used as chief fattening grains for lambs. The proportion of protein supplement that may be needed with such grains will depend upon the kind of hay or other roughage that may be fed along with the grain. If good alfalfa hay is available it may be fed with corn or similar fattening grain with a minimum of protein supplement.

When non-leguminous hays or roughage such as timothy hay or corn stover make up the primary roughage part of the ration a protein rich meal such as cottonseed or linseed will be needed to balance the fattening ration for lambs. A good ration may consist of 7 parts of corn and 1 part of cottonseed meal, by weight with corn silage and clover hay. The daily allowance per lamb should be approximately $1\frac{1}{3}$ pounds each of concentrates, silage, and hay, or a total of 4 pounds of feed a day after the lambs get on to a full feed. Such a ration would approximate the requirements of normal lambs entering the feed lot at an initial body weight of 60 to 65 pounds and finishing in 80 to 90 days at average final live weights of 90 to 95 pounds.

If silage is not available other succulent feeds suitable for fattening lambs are turnips, mangels, rutabagas, wet beet pulp, beet tops, cabbage, and cull potatoes, but these contain more water and less solids than silages, especially corn silage. However, the quantity of roots for lambs in a daily ration would be about the same as $1\frac{1}{3}$ pounds suggested for silage.

THE IMPROVEMENT OF GOATS

There were about 2,000,000 goats in Yugoslavia before the war, mostly in the rough hilly country where pastures were poor. These animals lived by foraging on rough range and were not being improved by careful breeding. As a source of milk and meat they were important and the possibilities of their improvement are not generally understood.

A doe of improved breeding can produce milk weighing ten times her own weight in a single lactation period. They produce best when 4 to 6 years old but often live to be 15 years or older. Breeding experiments with milk goats in America has shown that by selecting dams and sires on the basis of milk-production records gives just as rapid improvement with goats as with dairy cattle.

While goats should and do give way to sheep in areas where the soil is suitable for cultivation, there are many areas where the hardy goat will thrive better than any other domestic animal. Among the various areas in Yugoslavia there are doubtless many herds that have been carefully selected by their owners for many years that would furnish the foundation stock with which to start a goat improvement breeding station for each of the principal goat-raising areas. Native stock would probably be better than any imported breeds, but both classes should be tested. This is a task for a livestock breeder who is experienced with goats as well as with the traditional methods of breeding them.

THE IMPROVEMENT OF SWINE

YUGOSLAVIA's swine industry before the war was flourishing, and live hogs, pork, and lard were important items in her export trade. The total swine population averaged 3,000,000 head, and comprised primarily the domestic Mongolica and Shishka, the Yorkshire, and the German Edelschwein breeds, as well as various other types and crossbreeds.

Four years of war have so reduced the swine population that a vigorous rehabilitation program is necessary to bring the number of animals to a point where the swine industry will again be a significant part of the nation's economy. Such a rehabilitation program would create an unusual opportunity to assist farmers to improve their methods of swine management, regarding breeding, feeding, housing, sanitation and disease prevention, and marketing.

During the immediate post-war period it is important to raise as many pigs as possible; this is best accomplished if all available sows are used for breeding purposes. The problem of insufficient feed is not as likely to be a deterrent factor for swine in the grain producing areas. Because the supply of meat in the country will be far below its needs, it may be difficult in many cases to persuade owners of sows to breed them rather than slaughter them for meat. The retention of breeding sows could be encouraged through temporary legislation, providing inducements offered by the national government.

ESSENTIALS FOR A PROGRAM

A rehabilitation program for the swine industry should include: 1) The establishment of centrally controlled demonstration and breeding stations; 2) a broad educational program aimed at individual producers; and 3) the organization of coöperative community swine raising projects employing good swine management practice.

It is impracticable to present a plan for demonstration centers which would be suitable for all areas in Yugoslavia. Geographic and economic conditions vary so greatly from one part of the country to another that techniques of swine management applicable to one region are entirely unsuited to another. A good policy to follow in setting up a demonstration unit in a given area is to present the most practical way of raising hogs in that area.

In the fertile Pannonian Plain, where hogs have been raised for market, a demonstration center could employ the most scientific methods of raising and fattening animals. The center itself could have a layout including farrowing houses, feeding barns, sanitation and disease prevention equipment, and facilities for preparing feed. It would carry out experiments in breeding, and in methods of feeding for quick meat development.

In the mountain areas of Herzegovina and Montenegro, on the other hand, a demonstration unit would adapt itself to a method of raising hogs for local consumption. In such areas, the aim should be to provide a source of meat at low cost. Elaborate housing and feeding practices are impractical. Nevertheless, a demonstration unit there may be very valuable, for existing standards of hog raising are often far below what is possible.

Improved breeding, feeding of balanced rations, and basic sanitary precautions involve little outlay of money or effort, yet effect considerable improvement in the total pork or lard yield. A demonstration unit may make great strides in developing breed strains and feed material especially adaptable to the area, and in encouraging such health measures as clean hog quarters, dipping vats, and inoculation against hog diseases.

An essential for the improvement of the swine industry is a nationwide educational campaign. This should go along with the use of local demonstrations. Trained agents could be stationed at central points throughout the country, visit neighboring farms, give lectures, show motion pictures and give advice to individuals.

An educational campaign, whatever form it takes, is not likely to be successful by itself. For example, lectures, moving pictures, and litera-

ture on the advisability of inoculating animals against diseases will be effective only if veterinarians with inoculating serum and equipment are available. Similarly, a campaign to encourage the feeding of protein supplements is not likely to achieve results if cheap protein feeds are not available.

Coöperative projects present the best opportunity to spread knowledge of the most effective and economical swine raising methods. When the resources of a given community are pooled, measures which would not be possible on a small establishment are often feasible. Equipment and feed materials which would be beyond the scope of a small farmer may be purchased, and the best trained man in the community in the most scientific methods of swine management may be hired as manager of the project.

Native sows should be secured to start the breeding herds, so far as they are available. Boars of these breeds should be used at first. The purpose of using native stock is to repopulate as soon as possible those breeds indigenous to the country. When facilities permit, it would be desirable to import better boars for breeding purposes, if none are available in the country, to cross with the various breeds.

When swine numbers have been brought up to practically a normal basis, it may be desirable to import new breeds from other countries in an effort to determine their adaptability when handled under Yugoslavian conditions, or for crossing with native breeds to improve the characters of economic importance, such as prolificacy, mothering ability, feed lot efficiency and carcass quality.

The success of the swine plan can be realized only after the supply of feeds essential to a well-balanced ration have been greatly increased and the peasants have learned the essentials of the best breeding and feeding methods. The production system prior to the war had been to market hogs at 18 months to two years of age. Improved methods of feeding and management will produce market hogs at 10 to 12 months of age.

The value of a balanced swine diet containing the protein, vitamin and mineral elements essential to supplement properly the cereal grains for most efficient production, should be shown at each demonstration center as an important part of the educational program. Protein feeds are necessary to successful hog feeding, and protein should not be omitted from the diet. A well-rounded plan for the reconstruction period should therefore take into consideration the development of sources of protein feeds of animal and plant origin that can be developed to adequately meet the needs of the swine program.

The aim of all breeding experiments is to develop an animal which will

produce the most meat or lard for a given amount of feed and care. At the same time, the animal must be adapted to the area in which he is raised. It is a mistake for hog breeders to try to introduce universally a strain which has proved singularly efficient in one area. If the improvement of native stocks, rather than the introduction of new breeds, is emphasized, there will be fewer difficulties rising from lack of adjustment.

Boar breeding centers may aid in the better-breeding campaign by making high quality boars available for service with sows of individual farmers in the area, as well as by showing the superior meat or lard producing qualities of well-bred hogs. Farmers could bring their sows to these centers to be bred. These boars should be kept on farms whose owners or tenants were experienced hog men. A remuneration commensurate with his duties should be paid the man who operates the boar breeding center. The same man would also check on the number of pigs farrowed and advise on care, feeding and management of the sows bred to the boar from his center.

Feeding practices are perhaps the most important element in determining the dollar and cents value of a hog at market. Recent experiments in America show that hogs can be fattened for market at 10 to 12 months, instead of 18 or 24 months. Of all the elements of hog management, feeding is most directly dependent on the resources of the area. In general, hogs are able to assimilate a greater variety of feeds more economically than any other animal. For this reason, no attempt will be made in this article to describe ideal diets. Conditions in America are so different from conditions in Yugoslavia that generalizations applying to the one country may not hold for the other.

GENERAL FEEDING REQUIREMENTS

Experiments and future economic conditions can determine what feed combinations will prove best for hogs in different areas of Yugoslavia. Nevertheless, there are several feeding problems which must be faced by all hog growers.

First is that of obtaining a proper balanced ration. For quick growth of the animals, a balanced diet of cereals, minerals, and proteins is essential. The protein factor is especially important, since it is the primary element in developing muscle tissue. Likewise, minerals are necessary for sound bone structure. A balanced diet may be attained by combining feeds high in the various food requirements. United States experiments have shown that a protein supplement of twenty per cent is necessary with grains of low protein content.

Another problem is that of arranging for the best method of feeding. The animals may be fed by hand or allowed to choose their own diets from a self-feeder. Recent experiments in America show that hogs fed by the latter method make noticeably better gains than hogs fed by hand. A self-feeder is a device in which feed can be stored for the pig to eat as needed. Separate compartments hold different components of the diet. Since a hog will not over-eat when a large quantity of food is placed before it, the animal will select the right amount, and the proportions of the various feed elements that it needs. Usually a hog at a self-feeder eats small quantities several times a day, and thus assimilates a greater part of his food than one fed twice a day.

Suckling pigs attain full nutriment from their mothers' milk for the first two or three weeks. After that, supplemental feeds high in protein will increase daily gains.

Growing pigs require feed high in protein, to develop muscle tissue, while fattening pigs suffice on a primarily carbohydrate diet.

Breeding animals must not become too fat. Both gilts and boar pigs may be fed with fattening pigs until they reach 100-150 pounds, but then should be fed a reduced diet. The protein part of the ration should be increased just prior to the breeding season to provide for heightened activity during this period.

Pregnant sows should receive a ration with sufficient protein and mineral content to provide for the developing embryos as well as for the maintenance of the sows themselves. Gilts carrying their first litters require a higher protein percentage than old sows.

Sows suckling litters also require a diet high in proteins and minerals, so that their milk will provide the young pigs with sufficient nourishment.

HOUSING

Hogs should have a clean, well-drained, and well ventilated place in which to live. In cold climates the hog house should be of sturdy enough construction to keep the animals warm; in warm climates it should provide shelter from rain and heat.

Many thousands of dollars are lost in the swine industry each year because of deaths from disease. Almost all of this loss could be prevented. Simple sanitation methods like keeping hog quarters clean, making sure that the food and drinking water do not contain decayed or poisonous material, and isolating sick animals do much to prevent the spread of disease. Vaccines are available for many infectious hog diseases. A vigorous campaign to inoculate young pigs against hog cholera,

swine erysipelas, anthrax, and swine plague will mean that many more fattened pigs will reach the market. Similarly, the use of dipping vats to control skin pests will result in a healthier, more valuable herd. This subject is discussed in the chapter on the control of livestock diseases.

DRAFT ANIMALS AND FARM POWER

WHILE the increased use of tractors and other power machinery is desirable in some areas in Yugoslavia, such power cannot wholly supplant animal power because of the small holdings and rough and stony character of the hill country. With 88 per cent of the land holdings less than 25 acres in size, many small tracts being scattered over the neighborhood, the use of tractors and large machines is seriously handicapped. One reform could be in the combination of tracts and joint ownership of machines. Another is the development of smaller size tractors and machines. This latter trend has already appeared in America and other countries.

In the level valleys where grain growing predominates, mechanization will doubtless proceed rapidly as fuel becomes available at reasonable prices. The losses of animals and machines have been severe in these areas where it was comparatively easy for the invaders to collect them. Some special provision must be made to import or begin the manufacture of tractors and other farm machines since the initial cost of this form of power is relatively high. Provision for service and repair, fuel oil distribution and the training of drivers and mechanics make it a project of several years to introduce power machinery. The Soviet system was only developed after ten to fifteen years and in some areas the change led to over-mechanization and a subsequent return to the use of animals.

For immediate relief and to learn what types of machines are needed a number of tractor centers would be effective. Both the British and Soviets have had experiences during the war that show how to develop and operate such farm power centers.

A detailed survey of the farm power needs of various regions of Yugoslavia is needed before plans for aid can be outlined. Since farm machines should be expected to be used for at least a decade, care should be exercised to begin with the right types and not lead to the need for early replacement. Farm machines are an expensive luxury, unless kept in action for a large part of the time, such as the small-plot farmers of Yugoslavia cannot afford.

Horses, mules, oxen and cows must provide the most adaptable farm

power for which feed for maintenance can be grown, thereby reducing the cash outlay. Of the 1,200,000 horses in Yugoslavia before the war, over half were in the Danube, Drava and Sava valleys. A large number of these animals were destroyed or taken away by the invaders. In the south about 145,000 asses and mules were kept, and probably were not so greatly reduced during the war. The number of oxen and cows that were worked is unknown but certainly amounted to many thousands.

Immediate relief can probably be provided most quickly by importing draft horses from Hungary, Austria, Germany and Northern Italy. In the upper Danube valley there were large numbers of horses before the war and most of them probably still remain since the fighting was not so widespread in this area.

Breeding centers should be planned for horses in areas where more horses are needed. If mares were brought in and distributed among farmers to work, the centers could be devoted to keeping studs for general service of these mares. In three years the draft animal numbers could be doubled at the minimum cost. For some areas of the hill country mules offer some advantages since they can work and subsist on rough feeds.

Artificial insemination would be particularly useful in this situation, since it would greatly multiply the use of the studs and bring the service to the farms without loss of time by the farmers or the need of travel by the stud. Such service calls for careful technical supervision as it is a practice yet in its infancy. Its development would be similar to that for beef cattle described in a previous chapter of this book.

The hill farmers have used donkeys and small horses rather than mules for generations. This has been due, probably to the ability of these animals to subsist on the sparse forage of the hills when not being used in the cropping season. Mule breeding requires thrifty mares and is seldom practiced successfully on very poor lands. A small type animal is also best for travel in narrow roads and mountain trails such as must be the only outlet for many high valley regions for some time to come. The best form of relief for such areas is to bring into their local markets a sufficient number of animals of the type with which they are acquainted and can use in the traditional manner.

A Draft Animal Importing Corporation might well be a useful organization to be established under coöperative management. An adequate agency to discover sources of supply of animals in nearby countries; to assemble, transport and distribute them to the farm areas; to finance the purchases and attend to all the details of sanitary inspection, feeding, etc., involved in an import trade. By the purchase and movement of

large numbers at one time the animals could undoubtedly be delivered at much lower cost than by a small-scale operation.

The whole mechanical farm-power situation is in a state of evolution and is changing rapidly as scientific invention proceeds. No one can foresee what the situation will be in even ten years. New fuels, types of motors, the use of electricity, etc., each are being developed in different ways in different places. Animals still furnish the cheapest farm power in areas of small holdings. Even the ox and family cow can continue to be used economically in some instances because they can be kept and fed on home-grown roughage that does not involve a cash outlay by the small farmer.

• THE CONTROL OF LIVESTOCK DISEASE

THE eradication of livestock diseases has the double importance of economic saving by reduced losses of animals necessary to maintain the food supply and the elimination of animals as a source of diseases that are transmitted to humans such as tuberculosis, anthrax, etc. The widespread reduction in numbers of animals by the ravages of war offers the advantage to the country to make rapid progress in disease control provided all imported animals are disease-free and good livestock sanitation practices are taught in the new campaign of agricultural education.

Nation-wide disease eradication programs have not been developed in many European countries but were beginning when the war started in 1939. Most Balkan stockmen had learned to live with diseases and regarded the effort of completely eradicating them as practically hopeless. The old native breeds of animals in the Mediterranean area had in some cases developed certain degrees of immunity to some disease, as for example foot-and-mouth disease in Italy. The natives followed certain traditional practices of isolation of diseased animals to check epidemics and some home-made remedies, but a general program of livestock sanitation while well advanced in Central Europe was still just beginning in Southeastern Europe.

The veterinary personnel of Yugoslavia was insufficient to meet the needs of the country before the War. In 1934, there were reported to have been 413 government veterinarians, 81 military veterinarians, 158 private and communal veterinarians, and 78 retired veterinarians in the country, a total of 730. In 1919 a veterinary school was established at Zagreb. This school had an enrollment of 43 pupils in 1919 which had increased to 499 in 1933.

A veterinary service was organized under the Ministry of Agriculture

in 1930 for livestock disease control with a veterinarian in charge. The veterinary branch of the Union of Health Coöperatives performed very useful services among coöperatives, and was when the war broke out in Yugoslavia in 1941 making good progress. Laboratories for diagnosis and the preparation and control of serums were established at Belgrade, Krizervae and Ljubljana. Veterinary sections were organized under the Ministry of Sanitation at Belgrade, Zagreb and Skoplje. There was a serum institute at Zagreb and Novi Sad. Under the Ministry of Public Instruction there was a section for the study of contagious diseases at Zagreb.

From the remainder of these staffs a considerable number of leaders will be available to reorganize the sanitary campaign to build up what was begun during the decade before the War.

The size of the task of livestock disease control is suggested by the statistics of livestock in round numbers for the period 1933-1937.

Cattle	4,100,000 head	Horses	1,200,000 head
Swine	3,100,000 "	Mules	20,000 "
Sheep	9,900,000 "	Donkeys	120,000 "
Goats	1,900,000 "	Poultry	22,400,000 "

During the early reconstruction period there will be considerable unrestricted movement of animals from one place to another within the country and also probably from bordering countries. Such movements of stock would be favorable to outbreaks of infectious diseases unless control is organized early in the post-war period.

A quick survey of the livestock in the country should be made for the detection of infectious diseases of a serious nature, such as rinderpest, foot-and-mouth disease, anthrax, glanders, hog cholera, rabies, etc. Steps to control their spread are to be immediately taken through quarantine, the use of proper treatments, disinfection and other sanitary police measures. Continued vigilance should be exercised in the movement of animals and animals under suspicion should be quarantined until their health status is established. In addition to the foregoing, attention should be given to the treatment of sick animals and at the same time, as opportunities present, a program of livestock management and feeding should be integrated with disease control measures.

If the available veterinary personnel is not sufficient, an effort should be made to bring these in from other countries. Local stockmen should be given limited training to work under professional direction. The country could be divided into convenient districts with veterinarians in

charge of each. The work in the various districts would be advanced most rapidly through the coöperatives. In addition to veterinary personnel, there should be established a veterinary supply base, laboratory, and disease control center for each section of the country. Such bases could be of a temporary nature and their equipment could be later transferred to a central control laboratory or otherwise used under a permanent establishment.

The disease control organization to be set up should provide quarantine stations at proper points to check the health of both imported and native animals as may be necessary. A program of livestock breeding, feeding and management should be integrated with the disease control program.

Since a long-time project requires considerable veterinary personnel, attention should be given to enlarging the facilities of the prewar veterinary school and to establishing new institutions. A government veterinary organization should be established and plans made to control infectious diseases and eradicate those that are possible of eradication under conditions existing in the country. A survey should be made of the prevalence and extent of the various infectious diseases, and programs for their control inaugurated in line with well-known methods of procedure as are practiced in various countries of the world.

Pending the opening of the veterinary schools, selected students should be sent to veterinary schools in foreign countries. Laboratories for the preparation of biological products should be located in various parts of the country for diagnosis of diseases of animals and poultry.

The most important factor in the economic production of healthy livestock and poultry is the skill and knowledge of the owner. Disease is a broad term which includes functional and digestive disturbances that may result from improper feeding or management, malformations or poor functioning which may result from the breeding of poor types, poisoning which may be due to permitting animals to graze on poisonous plants, or through accidental poisoning. All of these, directly or indirectly, affect the development and spread of infectious disease in a community. To a very large extent, therefore, the control of disease in general is in the hands of the individual owner and veterinary service can improve and reduce losses only to the extent that there is improvement in the practices of the owners. Efficient and economical livestock production is primarily in the hands of the owner himself, but he can be immeasurably aided by an efficient veterinary organization. General improvement requires an educational campaign of large numbers of farmers in livestock sanitation.

A PROGRAM OF INSECT PEST CONTROL¹

A LONG-RUN program of insect control in Yugoslavia will be necessary if the Nation is to achieve and maintain maximum food production. Such a program should include surveys to determine the distribution of various pests, research in insect habits and methods of control, a system of plant quarantine to prevent the spread of insect pests and a campaign of education of farmers. This work would require centralized planning and direction. It could best be carried out through a government unit, under the Ministry of Agriculture.

Educational facilities are essential in order to provide the trained personnel for a program of insect control. One or more universities or technical schools should be encouraged to give students an opportunity to specialize in the study of insects and their control. Local specialists and consultants borrowed from other countries could be drawn upon in order to establish a small insect control unit in the beginning. But in addition, it will be necessary to provide graduate students in entomology as the work of the control unit progresses. Such graduates will be needed for replacements and for the purpose of filling additional positions.

Research investigations will be needed to provide the information on which to base insect control programs. The prevalent insect pests should be studied with respect to their life history, habits, distribution, and methods of control. The proper development of this work requires that suitable facilities for observation, field experiments, and the testing of control methods be made available. It is essential to have a central field station which would provide laboratory facilities and land for field plots. This might well be a part of a central agricultural experiment station. For proper functioning, it should be located in an agricultural area.

INSECT-PEST SURVEYS ESSENTIAL

If insects are properly identified, it greatly aids the work on insect control. Once identification has been obtained, it is possible to obtain information on biology, and on effective methods of control. An insect-pest survey should be conducted at an early date in order to collect information regarding the distribution, character and damage to crops caused by specific pests. Later, information of this sort should be collected periodically to serve as a basis for estimating crop losses under

¹The newly available insecticide DDT has caused a revolution in the methods for ridding agriculture of insect pests, but its use generally under the circumstances described in this book might have serious consequences, as scientists have warned. The remedies described here have had the endorsement of American agricultural scientists.

different conditions, and for making forecasts of outbreaks. Useful information on insect identification and control developed by the research unit should reach the farmers as quickly as possible and over the widest possible area. It may be necessary to demonstrate new equipment and methods of pest control under field conditions.

Certain insect problems arise from time to time that are of such a nature that they cannot be handled by individual farmers. Epidemic outbreaks of locusts represent one example. Another is the appearance in limited areas of pests of foreign origin against which new eradication measures must be undertaken. The San José scale outbreak is an example of this type. The costs of control in such cases are frequently very high, but justifiable. Eradication of insect pests is for the benefit of the country as a whole, rather than for the benefit of the individual farmer. For that reason, the control and eradication programs should be financed by the government, and a control unit under the government should have the responsibility of conducting the work.

The enforcement of quarantine regulations to prevent the entry of plant pests and diseases is essential to a long-run insect control program. All inspection stations at ports of entry and at central points for rail shipments must be maintained. Thorough inspection of all imports of plants and plant products is essential, not only to insure that quarantines against specific pests and diseases are enforced, but also to prevent the entry of other materials that are found upon examination to be infested with harmful pests. Inspectors must be sufficiently trained in entomology and plant pathology to be able to recognize the different types of insects and plant diseases that may be encountered. The entomologist in charge of this work should have sufficient training and experience to prepare new regulations as the need arises for both foreign and domestic quarantines.

EXAMPLES OF INSECT CONTROL

The following are descriptions of some of the most prevalent insects which attack food crops with suggested methods of controlling such insects.

Plum Scale

The only known destructive insect attacking the prune-plum tree is the European fruit lecanium (*Lecanium corni* L.). The insect was first observed in 1919, and in the following ten years killed about ten million trees. In years of general outbreak, due to favorable weather conditions, this insect has reduced the Yugoslavian prune plum crop to one-third of

normal production. Since 1930, when the occurrence of the insect subsided greatly, the degree of infestation has varied considerably from year to year.

The European fruit lecanium is an insect of the family commonly called terrapin scale. In the winter, it can be recognized as shiny, nearly hemispherical scales about 4 mm. in diameter, covering the undersides of the twigs. Adult forms are dark brown in color, with darker areas which give the suggestion of a pattern. Young forms are much more flattened and are greenish in color. In the summer, the fruit and foliage will be covered with masses of honeydew which collects dust and also serves as a medium for the growth of a sooty fungus.

Only the immature females survive the winter. The young, produced in early summer, feed on the underside of the leaves by sucking the sap from the veins. After about one month, the females migrate to the twigs and continue feeding until cold weather.

Control of this plum scale can be accomplished by the application, during the winter, of a 4 per cent lubricating oil emulsion. A stock is prepared by mixing 10 liters of lubricating oil, 1 kg. of potash fish-oil soap and 5 liters of water. This mixture should be boiled and then, while still hot, pumped several times through the sprayer. Six liters of this stock is added to 100 liters of water to make a 4 per cent spray.

Another mixture, which eliminates the need for heating, is made with 9 liters of lubricating oil and 1 liter of resin fish oil soap. Add the oil, a small quantity at a time, to the soap and stir thoroughly. About $4\frac{1}{2}$ liters of this stock should be added to 100 liters of water for a 4 per cent spray.

The spray solution should be applied to the trees when the temperature is above freezing, by means of a strong metal sprayer. About 50 liters of the emulsion will be required per acre of prune plum tree.

Gypsy moth

A pest which attacks plum trees, especially in the central area of Serbia, is the Gypsy Moth (*Porthetria dispar* L.). In the full-grown larva stage, this insect is a pale brown caterpillar about 50 mm. long with long tufts of rather stiff brown and yellow hairs projecting from the sides of the body. It has five pairs of blue tuercles, followed by six pairs of red tubercles, arranged in two rows down the back.

The young caterpillars (larvae) are very greedy eaters, often eating all the leaves from the trees. This pest occurs most frequently in the vicinity of deciduous forests, from which it spreads in large numbers during favorable seasons.

The various stages in the life cycle of the Gypsy Moth are briefly as follows: Eggs are laid in late summer in masses approximately 25 mm. long, covered with hair of a light brown grayish color. In the early summer of the following year, the eggs hatch into caterpillars which spin cocoons on the tree trunks. The moths emerge in midsummer. The males are dark brown and have strong wings. The females are light-buff in color, heavy, and able only to flutter along the ground.

Control of the Gypsy Moth can be accomplished readily by two applications of a spray prepared by thoroughly mixing approximately 4 kg. lead arsenate with one-half liter fish oil or raw linseed oil in 350 liters of water. The spray should be applied in the early summer when the caterpillars emerge and start to feed. It should thoroughly drench the trees. Approximately 13 kg. of lead arsenate per acre will be required for two treatments on average size trees.

San Jose Scale

The most destructive pest of the apple tree in Yugoslavia, though not generally distributed over the country, is the San Jose scale (*Aspidiotus perniciosus*, C.). The full-grown female scale is about 1.5 mm. in diameter and of a dark brownish or blackish color, with a dull yellow center. The young scales are sooty-black, often ashy in appearance where many are crowded together. The male scales are smaller than the females and of an oval shape. Near the center of the scales is a raised nipple-shaped spot which serves as a convenient means of identification.

These scales feed on the sap of the tree and upon the fruit. The sap-sucking action interferes with the growth and vigor of the trees, resulting in thin foliage, more or less yellowed and spotted because of the presence of the scales. The infested fruit has a spotted or mottled appearance because of a small red inflamed area surrounding each scale. Infested trees are often killed and even moderate infestation renders them unproductive.

The method of control is the same as that used against the plum scale.

Codling Moth

In all probability, the entire apple acreage of the country is sufficiently infested with codling moth (*Carpocopsa pomonella* L.) to justify treatment. It is one of the most persistent, destructive, and difficult to control of all the insect pests of the apple.

The codling moth passes the winter as a full-grown larva in a thick silken cocoon generally spun under loose scales of the tree bark. The larvae are pinkish-white caterpillars with brown heads and are about

20 mm. long. They emerge in early summer as grayish moths with a wing spread of 12–20 mm. The wings have chocolate-brown patches on the back part, and faint crossbands of brown on the other parts. Eggs are laid on the upper side of the leaves and twigs a short distance from the apples. The hatched worms, within a few hours, eat into the young apples. In three to five weeks, upon becoming full grown, they return to the cocoon stage. There may be two or three generations of the insect each season.

Three applications of a lead arsenate spray should give reasonable control. The spray is prepared by mixing 1 kg. lead arsenate in 300 liters water. The first application should be sprayed on when about three-fourths of the petals have fallen from the blossoms, and the other two applied one and two weeks thereafter. The three applications will require about eight or nine kg. of lead arsenate per acre.

Grape Berry Moth

The most serious pest of grapes in Yugoslavia, as in other parts of Europe, is the berry moth (*polycrosis botrana* S.) which often destroys a third or more of the crop. The berry moth passes the winter in grayish silken cocoons, folded in fallen grape leaves. The grayish, or grayish-purple moth, about 12 mm. across the wings, emerges about the time the grape blooms. The larvae or caterpillars hatch from circular, cream-colored eggs, and spin silken webs which bind together small fruit clusters. The caterpillars are greenish gray with brown heads, and as they feed on the grapes, grow to a length of 8–12 mm. There are two or three generations of the insect each season.

A satisfactory method of control for the first brood is a spray prepared by mixing 1 kg. lead arsenate in 300 liters water. The spray should be applied with a high pressure sprayer so that a fine spray will be formed, which will cover the grape berries. The first application should be made shortly after the fruit has set and the second about 10 days later. The two applications will require about $2\frac{1}{2}$ kg. of arsenate per acre. Lead arsenate cannot be used against the second and third broods of the moth because of the danger of a poisonous residue remaining on the fruit. Pyrethrum dust, applied with a duster, may be used instead. This is prepared by mixing 1 part of pulverized pyrethrum flowers with two parts of powdered talc or finely pulverized tobacco stems, leaves, and scraps. Finely powdered clay or gypsum may be used in lieu of talc. The tobacco may be obtained as waste from a tobacco plant. The dust must be used fresh, as it rapidly loses its insect killing power with age.

In addition to the spraying or dusting, the berry moth may be par-

tially controlled by thoroughly cleaning up the vineyards and burning the raked fallen leaves during the fall or winter.

Cabbage Caterpillars

Cabbage and other cole crops are very generally attacked by caterpillars of several species, such as the imported cabbage-worm (*Ascia rapae* L.), cabbage looper (*Autographa brassicae* R.), and the diamond-back moth (*Plutella maculipennis* C.). They are usually of a greenish color and of all sizes up to 40 mm. long. The caterpillars eat holes in the outer leaves, and if unchecked, so affect the plant that the heads are stunted or do not even form.

Infestations on younger plants, before the heads have begun to form, may be controlled by dusting with undiluted calcium arsenate, or lead arsenate dust (1 part lead arsenate mixed with 1 part hydrated lime). These insecticides should not be used after the heads begin to form. Calcium arsenate can be purchased ready mixed or can be made by adding arsenic trioxide to slaked (hydrated) lime in hot water. Arsenic trioxide is obtained as a deposit on the inside of a long condensing tube connected to a closed pot containing burning pyrites. Hydrated lime may be made by slaking quick-lime (calcium oxide) in hot water. After the vegetable heads have begun to form, pyrethrum dust may be used to control the caterpillars.

If the diamond-back moth is present in destructive numbers, it may be controlled by the application of a dust prepared by mixing 1 part, by weight, of tobacco dust with 8 parts of hydrated lime. The amount of dust required per acre is 10–20 kg. for each application. Several applications may be necessary. The larva of this moth may be recognized as a greenish caterpillar not more than 8 mm. long, which feeds on the underside of the leaves, and wiggles actively when disturbed, or when dropping on its spin web.

Cabbage Aphids

These vegetables are frequently attacked by aphids, or plant lice. This whitish-green insect is approximately 1.5 mm. in diameter, and clusters on the leaves, sucking the sap. The affected leaves curl or crinkle, and in severe infestations, wilt and die. The plants, if not killed, are dwarfed, grow slowly, and form only small heads.

These aphids may be controlled by the application of the nicotine dust described above. It should be applied whenever the aphids begin to be abundant. The dust should be applied with a duster when the plants are dry and when the temperature is above 20° C. In the treatment of

small garden plots, the dusts may be placed in a coarse bag and shaken over the plants. A tin can with holes punched in the bottom and fastened to a stick will also serve as a satisfactory shaker.

Potatoes Tuber Worm

Both field and storage potatoes may be infested with the tuber worm (*Gnorimoschema operculella* Z.). Infested tubers are riddled with slender, dirty, lined burrows of pinkish-white or greenish caterpillars up to 20 mm. long, with dark-brown heads. Some of them burrow in the stems or mine in the leaves. The adults are grayish-brown, mottled and with dark-brown, and have a wingspread of about 15 mm. An entire generation may develop in a month of warm weather. The injury from the worms is greatest while the potatoes are in storage.

To prevent infestation of the tubers in the field, the infested vines should be cut and burned a few days before the tubers are dug. Potatoes that are infested, and which are to be stored, should be fumigated with carbon disulfide. To fumigate the potatoes, they should be placed in a bin or room made as air tight as possible. For best results, the temperature should be 25° to 30° C., but never below 15° C. The fumigant may be poured on gunny sacks, rags, or cotton waste, scattered over the top surface of the potatoes in the bin. The bin, or room, should be kept closed for 48 hours. About 2½ kg. of carbon disulfide will be required per 30 cubic meters of space. Several treatments may be required to get rid of the worms.

Hop Aphid

Serious injury to hops is often inflicted by the hop aphid (*Phorodon humuli* S.). This insect, in appearance, is essentially similar to the cabbage aphid described above. Their feeding causes curling of the leaves, stunting and injury of the plant. This pest may be controlled by an application, as soon as the aphids appear, of a nicotine spray or dust. The spray may be prepared by mixing 1 part, by weight, of concentrate nicotine sulfate with 15 parts of water. To increase its effectiveness, this spray should be mixed with soap just before using. One part, by weight, of dissolved soap should be mixed with 200 parts of the above spray.

The pest may also be controlled by application of nicotine dust, prepared by mixing 1 part, by weight, of tobacco dust with eight parts of hydrated lime.

Hop Red Mite

Another destructive pest of hops is the red mite (*Tetranychus telarius* L.). Lightly infested leaves have pale blotches or spots showing through

the leaf. In heavy infestations, the entire leaf appears light in color, dries up, often turning reddish-brown in blotches. The underside of the leaves, on close examination, will be found covered with very small 8-legged mites $\frac{1}{3}$ to $\frac{1}{2}$ mm. in diameter, showing as reddish, greenish, yellowish, or blackish moving dots.

This pest can be controlled by carefully dusting very finely ground sulfur on the leaves, particularly the undersides. The very finely ground sulfur, if not purchased, can be obtained from pyrites as follows: Place pyrites in one end of a clay tube and close this end with a removable plug. Heat in a fire to a dull red, with the other end a little lower than the hot end. The free, cool end should be nearly closed with wet clay. Some of the sulfur will be deposited as a fine powder on the inside of the tube.

Webworms

Webworms (genus *Loxostege*) often cause very serious injury to sugar beets, alfalfa, tobacco, and various other field crops. Infested fields, during the spring and summer months, will show light webs over the leaves, in which will be found yellowish or greenish to nearly black caterpillars up to 30 mm. long, with black dots over the body. The web will include a tube possibly 100 mm. long, extending from the plant to a hiding place on the ground. The adults are night active moths having a wingspread of 20-30 mm. usually of a buff coloring, mottled with spots and stripes. There are three or more complete generations each year.

Species of webworms with similar habits to those found in Yugoslavia occur in the United States, and have been satisfactorily controlled by arsenical sprays and dust. On sugar beets, a spray containing 2 kg. of lead arsenate, or 1 kg. of paris green in 100 liters of water, is effective against the newly hatched larvae. This spray should be applied as soon as the eggs hatch and before there is much webbing over the plants. About 200 liters of the spray will be required per acre. The same spray may be used upon fields of other crops, provided the tops are not to be used for food. Paris green may be purchased as copper acetoarsenite.

Locusts

Locusts, or grasshoppers, are one of the most destructive insect pests attacking many crops in Yugoslavia. The infestations vary greatly from year to year and large sums of money have been expended in attempts to control them. In 1932, the egg beds covered 74,000 acres and the infestations were very heavy during the following years. There are many species of this insect.

An insecticidal bait is the most effective means of control. This bait consists of a base (a locally available material known to be attractive to the locust), and sodium arsenate mixed with water or oil to make a moist stiff mash. The amount of poison should be 1 part, by weight, to 20 parts of the base. The material used for the base, such as bran, may be diluted up to one-half with such materials as hardwood sawdust, corn cobs ground to the same particle size as the base, or hulls of cottonseed or oats.

The bait should be spread at the time the locust is attacking the crop, using 4 to 5 kg. per acre. It can be spread by hand. One man scattering from a wagon can cover about 10 acres per hour. Sodium arsenate can be purchased or can be made by adding arsenic trioxide to sodium hydroxide or other form of soda, in water.

The above examples will serve to illustrate the problems of practical insect pest control. Sources of prepared insecticides must be developed to aid a general pest-control project. Several new insecticides have been developed during the war that should be made available by local manufacture to facilitate their use in Yugoslavia.

Plant diseases are more difficult to control than insect pests. They are not easy to identify and only the trained scientist or farmer with long experience can know them. The development of methods of control is therefore a task for trained specialists. When a disease appears the farmer needs the aid of this expert to diagnose and prescribe treatment. Outbreaks of plant diseases must be treated quickly if great losses are to be avoided,—therefore the responsibility rests upon a national agency. Since the control of the importation of pests and diseases of plants must rest in the government it is most effective to also provide that the bureau or office in control of plant quarantines be staffed and equipped to handle outbreaks of plant diseases. By general education farmers can be trained to identify and treat common crop diseases, but experts are needed at all times to identify and study methods of control for new pests.

A SOIL CONSERVATION AND MANAGEMENT PROGRAM

A NATIONAL policy and plan to preserve and properly utilize the land of Yugoslavia should take a prominent place in any new program for agricultural reconstruction. The fertility of the soil is a national asset that must be conserved and protected if the production of the country is to be maintained or increased. While the small-unit land system and other traditions may appear to present almost insurmountable obstacles

to such a program, the object is so vital that these difficulties should not be allowed to delay the beginning of a campaign to overcome them.

While the land of Yugoslavia has been tilled for centuries and necessity has compelled farmers to protect it to some extent by terracing and other devices, there has been no extensive system of fertilization or land management. The use of commercial fertilizer was on a very small scale and the relatively small numbers of livestock provided very limited quantities of manure. Tillage was inadequate due to the lack of machines. Low yields of crops resulted in too many cases. Green manuring and soil building practices were very limited in most of the country.

A soil conservation program based on the general lines as now in operation in America gives suggestions for procedure, which combined with such modifications as may be necessary to meet local conditions and practices may lead to helpful action in Yugoslavia. The United States Soil Conservation Service is a national government organization, part of the Department of Agriculture, with seven regional divisions and 48 state subdivisions. The national service has its research and demonstration stations and training school to prepare workers.

The working unit is the "Soil Conservation District." In 1944 there were over 1,100 of these throughout the country. The model law, which has been passed by most of the states, outlines the purposes as follows:

"An act to declare the necessity of creating governmental sub-divisions of the State, to be known as soil conservation districts, to engage in conserving soil resources and preventing and controlling soil erosion; to define its powers and duties including the power to acquire property by purchase, gift, and otherwise; to adopt programs and regulations for the discontinuance of land-use practices contributing to soil wastage and soil erosion, to adopt and carry out soil-conserving land-use practices; to provide for financial assistance to such soil conservation districts, and for other purposes."

It is probable that Yugoslavia's coöperatives would require special legislation to enable them to function fully for soil conservation, to expand their purposes, their authority, and their areas to permit the program to move smoothly and vigorously across whole watersheds and entire problem areas.

Consideration might well be given to legislation which would take cognizance of the effect of soil conservation in increasing production and farm income, making the nation more nearly self-sustaining, and improving the nutrition and general welfare of the people.

Research and surveys must go together. Research to assemble scientific findings pertaining to soil conservation and surveys to determine

the soil conservation problems that are most pressing in Yugoslavia, and to set up research studies looking to their solution. Experiment stations should be located in the problem areas they are intended to serve. It is important that there be a free exchange of information between research centers and farmers in the surrounding countryside. Promising measures often can be moved out of experiment stations for simple field trials on nearby farms before being released for general use.

The pioneering done in the United States can save Yugoslavia much time in organizing the work. Procedures have been worked out and practices established. While the United States had made many soil surveys the methods of handling different soils had not been worked out. Reconnaissance surveys, demonstrations of selected farms, coöperative activities with farmers has built up a large volume of useful experience. Priority is now being given to the methods, policies, and practices that would enable farmers themselves to do the work with the least technical assistance.

The surveys charting actual conservation needs for the United States is founded on strict adherence to land capabilities. The Soil Conservation Service, through its land-capability maps, now provides farmers with a utilitarian classification of his land according to its physical factors, not merely its chemical analysis as did the old soil surveys. Uses of land are indicated on the farm maps in four main categories—crops, grass, woods and miscellaneous.

As the results of these surveys a practical "job sheet" is becoming available to American farmers. This outlines, area by area—and eventually will farm by farm—the soil conservation practices that must be put on the land to assure maximum farm production at minimum soil loss.

Out of 59 soil conservation practices, 23 were selected by the Service as being of prime importance. Each of these 23 major practices directly increases crop production.

The typing of soils for productive capacities is regarded as fundamental to farm planning. Conservation practices are predicated on land capabilities.

To illustrate the types of conservation practices that are used in the United States for soil conservation the following are listed:

Practices found effective in increasing production within one year are: Soil amendments: lime, gypsum, sulphur, phosphates, potash, or manure; contour planting and tillage, listing; mulching; planting annual grasses and legumes; fencing pastures for grazing management; controlled grazing on pastures; and distribution of livestock by salting and herding.

Practices found effective in increasing production within two years are: Cover crops; annual green manuring; crop residue management; weed control; stump and stone removal; and planting pastures.

Practices found effective in increasing production after two years are: cover crops, permanent; crop residue management, protective stubble; strip cropping; gully control by planting and fencing; field border planting; maintenance of waterways; stream bank treatment by planting or fencing; stonewall and hedge removal; planting pasture and grazing land; inter-planting and spot-seeding woodlands; and woodlot and post-lot planting.

Demonstrations were extensively used in America's pioneering period. Small watersheds were selected for the first demonstrations—particularly, watersheds in problem areas. Individual farmers or groups of farmers, wherever possible, signed five-year coöperative agreements with the Soil Conservation Service. Under these agreements, farmers, both tenants and landlords, contracted to carry out the terms of the individual farm plan arrived at jointly by Service technician and farmer. The Service, on its part, agreed to provide certain technical oversight and assistance. In some areas, grass seed was sometimes supplied for seeding of gullies, or lime and fertilizer would be supplied, or fences to protect woodland, or nursery stock to effect needed plantings.

The Service established its initial training school where it would be convenient to the soil conservation experiment station and a demonstration farm. The location also afforded easy access to a conservation district where farm planners were at work. The teachers were drawn from the working staff of the Service. In 1942 twenty-five Latin-American students came to the United States for a year's study of soil and moisture conservation. They were a select group of young men from several countries.

Each trainee, after a short stay in Washington, was assigned to a soil conservation district work unit, where conditions approximated as closely as possible those he would meet at home. There he became an integral part of the field staff, taking part in all activities of the work unit, under coaching by Service technicians. Another delegation of students came in 1944, testifying to the opinion of the Latin-American governments that the training course is proving worth while.

The very character of soil conservation, whether in Yugoslavia or in the United States, presupposes coöperation of farmers. Lacking such coöperation, all the organization, practices, techniques and training would likely end in failure. Erosion problems know no property lines, fences, or hedges. Farm improvement becomes futile, unless groups of

farmers join together, linking their water-disposal systems, adjusting farm plan to farm plan, going into partnership for the purchase of heavy equipment, sharing the responsibilities and the benefits of the common program.

It is logical that the *zadrugas* should provide the impetus, the force, and the mechanism for getting soil conservation started. Given such legislation as may be appropriate and such reshaping as may be indicated, the *zadrugas* conceivably could duplicate in Yugoslavia the role of soil conservation districts in the United States.

AN IMMEDIATE SOIL CONSERVATION PROGRAM

Some of the essentials of a nation-wide soil conservation program for Yugoslavia, based on available reports of physical conditions and considered in relation to experience with successful programs elsewhere have been outlined as follows by the leading authority in soil conservation.

1. Selection of an appropriate beginning staff of experienced technicians, to study the situation and plan detail is the first essential.

2. A survey of land conditions and land needs comes next. This would involve a quick reconnaissance survey of land conditions throughout the country, covering particularly slope, soil, condition of erosion, susceptibility to erosion, and practical possibilities for conservation work. From this survey it would be possible (a) to determine the approximate extent, feasibility and cost of the job to be done—the acreage of terracing, contouring and strip cropping which would be required, and the areas needing draining, irrigation, crop rotation, pasture improvements, etc., and (b) to determine also the location, labor and material requirements, feasibility and other factors of various useful projects of a public works nature, such as protection of highways, drainage, irrigation, planting of critical watershed areas for flood control and prevention of silting, and sodding and drainage of airports.

3. The selection of work areas is the first step in operation. Highest priority for beginning operations should be accorded those locations where there is the greatest urgency and where soil conservation work holds the greatest promise of early and material results. Entire small watersheds often are the most convenient units for soil conservation, good land use, and flood control. At other places, the best work areas may be on only the rolling parts of the wide valleys. In any event, prospective work areas under the initial or reconnaissance survey should be considered broadly and without primary regard to individual farms.

4. Using land according to its capabilities is a principal objective.

After the initial work areas are selected, proper use of the land should be determined and included in the conservation work-plans for each farm within the selected areas, on the basis of land capability, as nearly as may be practicable. Under such procedure certain areas will be pointed out as suitable for cropping, with necessary protection and soil-building practices. Other areas, because of steepness of slope, shallowness of soil, susceptibility to erosion, or other conditions, would be proper for forestry, grazing, wildlife, or other uses.

5. The installation of the simpler practices comes next and extends the work most rapidly. Any effective soil conservation program would proceed gradually but continuously. The simpler practices, such as contour cultivation, tree planting and pasture improvement, should be put into use first. Most of them probably can be installed by the average intelligent farmer, with a minimum of technical assistance. They usually show early good results, serve as an encouraging introduction to complete and permanent soil conservation, and build a foundation of confidence among agricultural producers.

6. The intensive phase leads naturally into the use of more difficult practices, requiring some technical assistance, such as terracing, gully control, installation of grassed waterways, woodland management, pond development, and so on.

This briefly stated six-point program is sound, practical and adaptable. It charts a procedure, in order of sequence, based principally on soil conservation experience in the United States. It is meeting uniform success, also, wherever other countries are using it in the battle to save soil and water, increase yields and improve the lot of man.

EXPANDING FRUIT AND NUT GROWING

MUCH of the land in Yugoslavia is ideally situated for the growing of fruits and nuts. Hilly or rolling land is preferred for these crops as a means of escaping late spring frosts. This type of land, when planted to trees, can be so managed as to reduce its erosion. The climate of this country has such a variety as to include both temperate and subtropical conditions that a large assortment of fruits can be grown. The hardy kinds such as apples, pears, peaches, cherries, plums, apricots, and grapes should do very well in the temperate parts. Where the winters are milder other fruits such as grapes, figs, persimmons, and olives should be grown. In the mild south, oranges and lemons are grown, and avocados and grapefruit could be introduced. Berries and small bush fruits can be

grown in the temperate regions. The production of walnuts, filberts, almonds, and chestnuts could reach commercial importance in this country. While fruit growing has been carried on for a long time in Yugoslavia, it has not reached the stage of a highly developed industry.

While this country has temperatures and land that are favorable for fruit growing, there is a question of a dependable rainfall sufficient for the production of fruit. About 20 inches or more of rain during the summer months is required usually for fruit growing, and most of this must fall so that it is absorbed by the soil. It may be necessary where the rainfall is deficient to supplement it with irrigation. The value of a fruit crop is sufficient to warrant irrigation where the natural rainfall is not ample.

The development of a fruit growing industry in Yugoslavia should be promoted at once for several reasons: first, because the country is well suited for it; second, fruit is much needed to make the present diet more adequate; third, it will give another substantial agricultural industry; fourth, the anticipated improvement in the well being and prosperity of the people of Central Europe should be accompanied by a marked demand for fruits and their products. Considerable time is needed to get a fruit industry into production so it should be started at once.

The promotion of a fruit industry for Yugoslavia can be approached in part as relief and rehabilitation of the farm population. This would, through assistance to the growers, get many of the present orchards and vineyards back into production. To extend the production of fruit and to improve the diet of the farm family, further planting of fruit producing plants should be encouraged. Then there will be farmers with a desire to begin producing fruit for a nearby market who should have assistance. To get fruit growing started in a big way, centers of fruit production should be promoted if markets can be foreseen. Some planning organization should study probable demand and then decide on the most suitable locations for such producing centers as appear justified and assist the farmers of these sections to become established as fruit growers.

The marketing of fruits in a fresh condition is not the only way of disposing of them; some can be sun-dried or "evaporated," dehydrated, canned, made into preserves or beverages before marketing. Fruit producing centers a long distance from markets, or lacking rapid means of transportation to them, may profitably dispose of their fruit by processing it. These methods and the necessary equipment have been well developed in the United States and in some European countries.

Fruit growers' coöperative can best provide the necessary equipment for the production of fruit, grading and packing, cold storage, proc-

essing factories, and marketing agents. When these necessary facilities are to be organized by the local growers' organization, they should be based upon the best experience in the best fruit-growing countries.

In considering the development of a fruit industry, there is much more than a suitable location and the growing of the fruit itself. These are only half of the problem. The success of the enterprise will depend on a profitable disposition of the fruit and its products. This latter requires different skill and enterprise than is required for the production of the crop. Perhaps the most important element to consider in fruit production is the human element, which comes into play as the aptitude of the farmer for growing and handling fruit and again in the desires and tastes of the public who will buy the products in the market.

To fit such a highly specialized type of agriculture as fruit growing into a scheme where generalized farming has been the traditional practice is somewhat of a problem. The present system of farming, in which the individual farm is almost self-sufficient, in the past has led to the greatest independence and security for the farm family. The promotion of a change in agriculture in which the products of some farms are not intended for family consumption only but primarily for market involves both social and farm changes. Fixed ideas and customs have a controlling influence. The question of what will supply the urge to farmers to venture into the production of fruits for the market must be answered.

Diversification of crops will be necessary on the farms, for the labor of the resident family can best be employed by having occupation during the whole year. This is very well accomplished by practicing crop diversification and the feeding of livestock. In relation to entering the production of market fruit on a farm, diversification will be required to support the family while the fruit trees or other fruit plants are being established and the farmer is becoming acquainted with fruit growing. Even on an established fruit farm, the labor will be better employed where diversification takes the form of growing several fruits. The means for disposing of the fruit will also determine the amount of diversification to be practiced. When the grower is selling the fruit himself on a local market, he will do better by having a succession of fruits for sale so that he is in touch as frequently as possible with the customers to build up an acquaintance and reputation. The same may be true for a co-operative agency that is shipping its fruits to a distant market. The objection to growing market fruit on a diversified general farm is in the fact that the fruit may be neglected.

Small fruits and berries are valuable crops not requiring much land, but which could be grown on a general farm for cash income. This would

be particularly desirable where there is abundant labor to pick the fruit. Small fruits come into bearing early and may be a source of income while the tree fruits are becoming established. Fruit growing could be combined with the rearing and fattening of hogs, the hogs being run in the orchards at certain times during the year if the trees are protected. Poultry can also be raised in orchards. Cattle and horses do not go well with orcharding for they browse the trees.

Earlier it was stated that the hilly land of Yugoslavia would be very favorable for fruit growing. This is because hilly land allows the choice of sites that are less subject to damage from late spring frosts. The air drainage or the movement of air on the slopes of land is very important to avoiding late frost damage; on slopes of land there is usually good water drainage.

While slopes are recommended for growing fruits and nuts, sites should not be selected where the surface soil is too thin. Fruit trees do best on good soil that is reasonably friable to the depth of three feet or more. This is essential for water and root penetration. Trees on a shallow soil may survive but they will not fruit abundantly. Soil that is too stony for the cultivation of other crops may be put into fruit and nut trees, providing the soil is sufficiently deep.

Most kinds of fruit can be grown without tilling the soil if rainfall is ample. Under conditions of short moisture supply, however, cultivation is essential for good production. On steep slopes, this will lead to serious erosion unless great care is used in handling the problem. The best solution is the building of terraces to prevent washing. Another successful method is the planting of the trees on contour lines, cultivating along the tree rows, and leaving strips of grass between the rows.

The planting of fruit and nut trees along roadways may be advisable to supply local families. Frequently there may be more water for tree growth in these positions because of the collection of drainage water in roadside ditches. No region should be selected for growing fruit where there is an excessive amount of wind and particularly prevalent dry winds should be avoided.

Any proposed plan for the development of a fruit producing industry should be based on the experiences of the present existing fruit growers, for their practices and the varieties of fruits being grown are the accumulation of local experience for many generations. It will be necessary to make a survey of fruit growing as it is now carried on in Yugoslavia. This should be done by persons with wide experience in fruit growing, familiar with its developing in other countries.

Such a survey should determine whether, under present circumstances,

the fruit growing practices can be improved so as to give a greater amount of food or income to the growers. It should locate growers with special aptitude for producing fruit who would be desirous of receiving assistance in improving their orchards. The survey should include a study of the varieties now being grown and decide if they are suitable or whether something better should be looked for. The prevalence of insects and diseases affecting fruit trees should be determined. The study should also look into the methods of marketing of the fruit now being grown and opportunities for improvement. It will be important to know the specific varieties of fruits that now appear in the Central and Eastern European markets.

Experience in other countries shows that a particular variety will do much better in one location than in another that appears quite similar according to human judgment. In most cases, the specific adaptability of varieties cannot be predicted. In Yugoslavia, even with its small area, can be found many of the climates and local situations that occur in the United States. This means that any of the fruits grown in the United States and other countries of the temperate zone must be considered in choosing varieties for extending the fruit industry of Yugoslavia.

The testing of varieties and fruit growing practices will be a task for the government's experimental farms. These stations will also serve as demonstrations to the local farmers and even may become centers of instruction in fruit growing.

Before this fruit and nut program can be extended to the farmers, a nursery or several nurseries to propagate the trees and plants necessary will need to be started and maintained. Since both hardy fruits and sub-tropical ones are adapted to Yugoslavia, separate nurseries will be required for the propagation of the different trees. It will generally require two or three years or more before nursery trees can be grown ready to transplant on the farms. This shows the time required before the expansion of fruit growing can be started. The choice of variety to be grown will depend to some extent on whether they are to be used for farm consumption, sale on a nearby market, or are to be shipped to a distant market. Those intended for shipment must be ones that can be harvested in a firm condition and will continue their ripening in transit and complete ripening after reaching the market. When they are not to be consumed immediately, they must be varieties that will keep well in cold storage or common cellar storage.

To develop a good market for fruit, it is best to have only a few varieties which will become known by the dealers and the public. The determination of what these shall be will require the trial of many varieties

from which to select a few which will produce well, keep well on the market and are pleasing to the public.

The development of a fruit and nut growing program and its execution will require that the Government be an important agent to take action on the following lines:

1. Conduct a detailed survey of the present fruit growing and marketing situation.
2. Set up a program based on this information to discover the probable demand of the peoples of Central and Eastern Europe.
3. Supply information and make available training in improved orchard practices. Obtain some orchards that can be used as demonstrations of improved practices.
4. Introduce new varieties and propagate desirable fruit plants for distribution.
5. Promote the use of fruits as food.
6. Aid in the distribution of fresh fruit by providing refrigerated storage, transportation and marketing facilities.
7. Plan centers for fruit production that are favorably located and assist in the development of facilities for grading, packing, storage, marketing, and processing of fruits at these centers.
8. Enter into the development of irrigation projects where they are necessary to supplement natural rainfall.

These suggestions can only cover the most general aspects of the development of a fruit production program. A fruit-growing industry must be established slowly and carefully since several years pass between the planting and harvest. Mistakes are costly and can be avoided only by following the methods that have been tested by science and experience in areas where fruit-growing has become generally successful.

THE DEVELOPMENT OF FOREST RESOURCES

THE development and conservation of the forests of Yugoslavia form one of the most important parts of the program under consideration. Their systematic destruction by the Turk in Serbia was one of the most serious causes of Serbian economic backwardness, causing erosion and land wastage. The forest is a storehouse of wealth in the form of wood and other tree products of wide variety. So universal is the role of forest products that the description of them would fill many books. We simply review the materials of the forest under certain broad classifications and varied adaptations to use. Modern forestry sets up the ideal of the

forest as man's living. Managed as a crop, the forest can renew itself and yield its wealth indefinitely, supporting the civilization that develops in and about it. The growing and harvesting of forest materials can and should provide steady employment and wages for a great army of workers. On this foundation the industrial community can establish itself securely, with dependable income to support homes and stable tax revenues to provide local government and needed public services.

Forests have general usefulness in keeping the land productive and habitable. They absorb rainfall and check excessive run-off, thus holding the soil against erosion, modifying the flow of natural waters, and protecting streams and lowlands against inundations of silt and debris. They mitigate destructive and drying winds. They provide habitat for birds, game, and fur-bearing animals, and they add beauty and interest to the land for the enjoyment of the home owner and the recreation seeker. Under a proper system of harvesting, the forest can render these essential services while yielding its regular contribution of products. Forestry as a productive and permanent system of land use is an integral part of agriculture, and agriculture has a major share in all its benefits. Within the sphere of forest influence the farmer's land is protected and his water supply safeguarded. Forests provide the farm family with building material, firewood, supplementary forage for livestock, and often a harvest of wild fruit, nuts, or the like. Forest industries and communities afford a local market for farm produce and opportunities for employment in off seasons. Productive forests and industries lighten the farm tax burden by sharing the expense and extending the advantages of schools and roads. In these and other ways a forest economy, while maintaining the due proportion of the land for its own use, promotes the prosperity of the rest of agriculture and rural life.

The interests of economic forestry are concerned both with the growing of the forest crop and with its proper utilization. There are vital needs that the forest continues to supply and that can hardly be expected to grow less as the country's population increases. The experience of many countries points clearly to the wisdom of maintaining the forest and developing efficient means of utilizing materials that it supplies.

In central and northern Europe, factories are already producing from wood food for man, fodder for cattle, and a substitute for wool in clothing. Shortages of liquid fuel for motors are being made up by the use of wood in the form of gas or alcohol, and scientists have devised more efficient wood-burning stoves and furnaces for home and industrial use. Even pulping wastes are being utilized for sugar and tannin. Through these and similar developments, economic leaders are looking to the forest as a mainstay and support of economic existence.

Meanwhile, adequate and economical housing for the family of ordinary income in many countries still finds wood the cheapest material of proved adequacy. Wood is used in vast quantities for making pulp and paper in many parts of the world.

Such considerations as these emphasize the necessity of making the forest a permanent and productive part of our economy. Forest products may be of more vital service to Yugoslavia and to the world in the future than they have been in the past. The values at stake forbid that wood, the major forest material, should ever become outmoded and neglected. Yugoslavia, a nation of forests, should continue to be amply served by the forest—in plentiful and economical housing, in needed furnishings, equipment, and fuel, in abundant products of manufacture and chemical conversion, in industry and wages, and all that these things mean in a satisfactory scale of living.

The forest, unlike mineral resources, is potentially inexhaustible. The encroachment of other materials on fields of wood use is nothing more than the normal response of science and technology to the insistent modern demand for new and better products and services. Wood utilization likewise needs the increasing support of science to meet the modern challenge. Wood is an extremely adaptable material. Because of that very fact its adaptability should be tested and proved against the most searching requirements of the modern age. As with wood, so with other products of the forest—roots, bark, resins, extractives, and the rest. For the most part, the economic importance of forest products is not to be assessed in terms of past or even present markets, but by their inherent suitability to basic needs and their possibilities of adaptation to more exacting standards within their field.

Research in forest products is a definite part of forestry. It is concerned with increasing utilization values both to the forest grower and to the consumer, to the end that forest materials shall adequately meet the economic needs of the present and future. It has to do with the determination of properties and evaluation of quality of the material, the modification of properties in line with service requirements, the reduction of wastes and production costs, and the development of new and improved products.

There is both scope and need for a great enlargement of the research effort in the management and utilization of forests and in forest products. The forest is still too largely a neglected asset with respect to the scientific development and adaptation of its products. Research, consistently prosecuted and applied, can be followed up to large practical gains in the improved quality, utility, and marketing of forest commodities of

all kinds. By a sound development of its material values in accord with advancing service standards, forestry can look forward to the fulfillment of its largest objectives in the country's economic future.

The development of forest resources is both an immediate and long-time opportunity in Yugoslavia. Lumber is needed for reconstruction in all forms. While the principal building material may be stone and cement in many areas, wood is needed to some extent everywhere. It is indispensable in agriculture for the construction of many home-made devices so necessary to small farm equipment.

A well-planned emergency lumber industry equipped with modern wood-cutting machinery should be a part of the general reconstruction plan. No investment would give quicker returns by providing the needed product and at the same time provide employment for the workers in the areas removed from the industrial centers. The details of the organization needed are not to be developed in this discussion. Europe has had a highly developed lumber industry and has many competent men in this field. American forestry research has much to offer to aid in the later development of the wood industries but in the practical problems of the lumber industry the neighbors of Yugoslavia can be most helpful.

ELECTRIFICATION

SO FAR we have been outlining a possible program for Yugoslavia based largely on the intimate needs of her people, a program which could be largely carried out by their effort and to a considerable extent by their own resources. But this survey would be wholly incomplete if we did not include the all-important problem of electric power, which calls for capital investment on a much larger scale than the restoration and development of domestic economy. Therefore, this section of our plan will need international backing if it is to succeed in the near future. So much depends upon it, however, and such economic and financial gain is possible in it, that it should not be thought of in any other light than as a business project for the benefit of both users and investors.

The rapidity with which the benefits of rural electrification can be brought to the unserved farmers of any area are largely determined by the coöperative planning and efforts of the farmers themselves. Prior to the war there were about 500,000 kilowatts of electric power capacity developed in Yugoslavia by all methods, hydro and fuel, according to the World Power Conference reports. Nearly all of this power was generated and consumed by the industries. This quantity produced in Yugoslavia

is but a fraction greater than the capacity of the electric power stations which serve the city of Washington, of a million people, where nearly all of the power generated is consumed for residential and commercial purposes but serving no large industries.

Without electric power modern industry cannot survive and the industries of tomorrow cannot be established. With new sources of electric power, Yugoslavia could develop new industries, re-establish and expand old ones, so as to make use of her natural resources, employ her unused urban manpower, provide needed consumer goods at lower prices, and build toward a balanced national economy.

A SUGGESTED PLAN FOR THE DRINA RIVER BASIN

The Drina River is a tributary to and contributes about one-fifth of the Sava River flow. The Sava River is the principal river in Yugoslavia, and is one of the main rivers in the Balkan States. About one-third of the total flow of the Danube River is contributed by the Sava which enters the Danube at Belgrade.

The Drina River arises on the eastern slopes of the Dinaric Alps which form the mountainous backbone of the State. It flows from south to north, cutting a criss-cross pattern through the natural geographic center of Yugoslavia. Characteristic of the Drina river basin are numerous canyons and gullies cut through the mountains by the numerous creeks and rivers emptying into the Drina.

Because of its geographic features, this centrally located Drina river basin is ideal for the development of electric power. Its high rough terrain provides a natural gathering basin and its deep canyons present numerous opportunities for the construction of reservoirs to regulate water flow and produce power. Its mountain gathering sources, many of them 1,200 to 2,400 meters above sea level, are particularly favored by good rainfall and maintain a fairly uniform flow during all seasons of the year. The total fall of the Drina is more than 700 meters from the head-water elevations to the plains of the Sava. Almost the entire fall of the main stem of the river and much of the fall of the principal tributaries can be used for power development.

The accompanying map was constructed from contour maps of the Balkan area (scale 1:1,000,000) shown in official publications of Yugoslavia. Indicated on the map are prospective dams and reservoirs to be located at restrictions or canyons between the river banks where the fall of the river is concentrated. The center of the proposed basin development is less than 200 kilometers from almost all of the principal cities and large numbers of villages of the country.



**Proposed Development of the
DRINA RIVER BASIN
Tributary of the Sava River, Yugoslavia**
by Kenneth W. Ross and Fayette S. Warner, August 1944

The principal project of the plan, noted as "D4" on the map, is 100 kilometers from Belgrade. In the step-by-step development of the plan, it would be most economical to begin with the construction of "D6" followed by "D4." After the completion of "D4" the construction of upstream control reservoirs and an extensive system of power plants would take place in order to keep pace with the potential power needs. The "D6" project is needed to supply immediate power needs in the lower Drina, Belgrade and Novi Sad areas. It would have an installed capacity of 75,000 kilowatts. It would also furnish power for the construction of "D4" and be tied in with "D4" generating and transmission system, when this latter system is placed in operation.

The "D4" project contemplates a dam 140 meters high, located in a restricted gorge about 40 kilometers upstream from Zvornik. This dam would form a storage reservoir to regulate the flow of the Drina River. A power plant would be installed near the dam of 375,000 kilowatt capacity. Together these two projects would have an installed capacity of 450,000 kilowatts. This planned capacity approaches the Bonneville development in the United States and would place the project in rank with the present important power generating development of the world.

After the construction of the initial "D4" project, the plan suggests a series of reservoirs of adequate size to control the flow of the Drina River, not only for dependable power, but to reduce flood damage, to improve navigation in the Sava and Danube River, and to provide water supply during the dry season for the agricultural lands at the mouth of the Drina River.

The cost of the total Drina River power development, compared with that of similar river projects in the United States and estimated on the basis of American material and labor costs, would be approximately \$250,000,000. The first complete operating unit, including transmission and distribution, would cost about 80 million dollars. According to American experience, it would require a total of 60,000 man-years of labor in the construction work. Many would be employed permanently in the operation of the projects after the construction is completed and many more would be employed in the new industries established in conjunction with the power development.

A HEALTH PROGRAM FOR YUGOSLAVIA

BEFORE the outbreak of the War, Yugoslavia was making progress in developing health and medical personnel, facilities and public health services. In the period between the two world wars, the death rates for

all causes, for tuberculosis and other important causes of death, and the infant mortality rate were declining. Nevertheless, large needs still persisted; Yugoslavia still had a death rate among the highest of all the countries of Europe and was still plagued by one of the highest death rates from tuberculosis.

Though it will be some time before the full measure of destruction is known and the full effects of the War on the health of the Yugoslav people can be determined accurately, it is tragically clear that the nation has been set back a generation or more and that the health needs of the country have been vastly increased. It is certain, at least, that Yugoslavia must rebuild its resources for national health.

Yugoslavia faces a problem of such magnitude that only a beginning can be made when the nation is free to start its rehabilitation and reconstruction. Accordingly, it must embark on a long-range program that may take 5, 10 or even 20 years to carry out. By formulating such a program in terms of general objectives, it becomes possible to take wisely the first small steps.

The actual content of a comprehensive health program for Yugoslavia can be designed only after a careful survey has revealed the existing conditions and the needs that should be met. Nevertheless, world-wide experience in general, and the experience of the United States in particular, assure that organized preventive services should be made nation-wide as rapidly as possible. This provides the strongest supporting basis for other services, it costs the least in money for quick and large returns, and it can be instituted with a minimum of personnel and with minimum loss of time.

A comprehensive health program is basic to the nation's welfare and progress. Without it, all other plans for the rehabilitation of the country will not only be incomplete and inadequate, but also they will be more costly, less efficient and less productive than they can and should be. It is, therefore, essential that neither the planning, undertaking or financing of the health program should be left alone to the initiative of individuals, or to the interest of voluntary agencies, or to chance. Only the whole nation can command the necessary resources. Only a national determination to achieve health can be entrusted with the responsibility for the health of the nation. The funds that are needed for health services should come from an earmarking of a share of national wealth and production; a very small share will go a long way.

Since the health program must be sure of going on for years, its financing must be stable and assured. Since the returns from expenditures for health are large, it is sound to view them as an investment in the nation—

an investment in its manpower and in its productive capacity. Thus, even if confronted with temporary financial difficulties at the beginning of the post-war period, it would be good and sound policy to borrow money and to mortgage future production in order to have the funds for a quick and early investment in health. Such an investment is the safest kind to make, because it is an investment in the people themselves.

PRINCIPLES AND POLICIES FOR ADMINISTRATION

A comprehensive health program should have three objectives: prevention of disease, improvement of individual physical and mental health, and extension of good medical care. The three objectives should be approached simultaneously under a balanced program, with due regard for emergency situations that may require immediate attention. Unless a concerted effort is made to keep prevention in the foreground, the tendency will be to concentrate attention on remedial measures for illness.

The most essential and the first step to take is the development of a sanitary environment. This principle applies both to the individual dwelling and to the community as a whole. Until environmental sanitation has been accomplished, very little enduring public health progress is possible. Most sanitary procedures need not be expensive. By proper disposal of excreta alone, much contamination of the water and the food supply may be avoided. The simplest method for the sanitary disposal of excreta is the pit privy. It is especially adapted to needs of the rural homes and to the smaller villages. In urban areas a public sewer is always preferable, provided water under pressure is available. Household water supplies, whether derived from springs or wells, should be protected from surface pollution since no truly satisfactory method of treatment of water supplies for individual use has been developed because of the personal attention that is required. While public water supplies also should be protected against pollution, considerable recovery of quality can be accomplished by modern methods of water purification.

Of equal if not greater importance than protecting the water supply is safeguarding the sanitary quality of the food supply. Especially fluid milk needs to be produced under the best possible conditions and stored at low temperature. Where pasteurization is not practicable, milk should be brought to the boiling point before it is consumed. Food processing such as canning, drying or freezing tend to prevent deterioration and hence preserve the sanitary quality of the food.

A number of insects convey disease. Notable among these are certain types of mosquitoes. These breed in water and their propagation may be controlled by drainage or application of larvicides to the water. Flies also are carriers of disease. Their propagation may be controlled by the removal of decaying organic matter, especially manure of domestic animals. Under conditions where screening of houses is not practicable, considerable protection against these vermin may be accomplished by household sprays. Preliminary results from the use of the newer insecticides, such as the new preparation DDT, appear very promising and no doubt will find extensive application after the war.

Rats are the reservoirs of such diseases as plague and murine typhus fever. They will be numerous in areas where buildings have been wrecked. While ratproofing of buildings has distinct value, all methods of rat control will be needed. Measures for the proper collection and disposal of refuse are most important.

There are other desirable ways of improving the environment from the standpoint of human health. But if those outlined above are installed and properly maintained, a population should be reasonably well protected against the typhoid fever, cholera, dysentery, parasitic infestation, plague and typhus fever. These and related disorders account for a large proportion of illness and premature deaths in areas that are backward from the standpoint of public health. Essential measures of sanitation are not nearly so expensive as the diseases arising from negligence.

The reduction of preventable illness will of itself go a long way toward improving the general level of health and well being. Full stature and robustness of the individual rest in great degree on proper nutrition. Abundant food production is of course a prerequisite to an adequate food supply. Regardless of how sufficient the food supply may be, many people will still show the effects of faulty nutrition unless they appreciate the necessity for proper selection of foods required for their daily needs.

Even after people have taken full advantage of all effective preventive measures, sickness will still occur. It may result from accidents, from diseases for which there are no preventive measures. Good medical service readily available also has preventive effect in that it tends to shorten the period of illness and to lessen the disability that otherwise is associated with neglected illness. Good medical care involves the employment of competent general medical practitioners and specialists, dentists, and nurses, together with the several types of technicians who assist in the diagnosis and treatment of disease. A certain proportion of the patients will require care in a hospital. Such institutions should be of high

grade and be well equipped for the types of cases they accept for care.

In the United States as elsewhere throughout the world, curative medicine developed on a large scale ahead of adequate preventive measures. People who could afford to do so make their own arrangements for medical and hospital services. Those without means became the objects of charity or public assistance. Quite early, however, it became apparent that persons afflicted with grave mental disorders or with chronic disabling conditions, such as tuberculosis, could not provide for their own care and that the burden was more than could be borne through private charity. This sector of the illness problem has become fully accepted as a public responsibility and the care of such patients is supported by taxation.

That part of medical care sometimes referred to as profitable service has thus far resisted any high degree of public control. This is the care required for short-term illnesses occurring among persons above the level of dependency. Most people have to buy their medical service as they do other services or the ordinary necessities of life through the methods developed by private enterprise. As a result a considerable proportion of the population either gets no medical care in the event of illness or receives less than is needed. A large amount of illness and physical impairment goes undiagnosed until remedial measures are at best only partially effective.

The question at issue in the United States is no longer whether something should be done to equalize opportunity for receipt of medical care, but rather the discussion centers around how this end shall be accomplished.

The private hospitals and the professions concerned with the performance of medical care believe that a system of voluntary insurance, operating under their control, offers at least a partial solution. Already an impressive start has been made by the hospitals. In the last ten years they have enrolled some sixteen million subscribers (about 12 per cent of the population) in hospital insurance plans in the United States. These plans vary somewhat in details among the communities, but in general the contracts cover the ordinary costs of hospitalization, exclusive of physicians' services. Medical societies of the States more recently have become active in sponsoring medical insurance plans, also on a voluntary insurance basis. About one million persons are now enrolled. At first the plans contemplated fairly broad coverage with respect to types of illness and scope of care. More recently, and because of adverse financial experience, the tendency has been to restrict the professional care to surgery and obstetrical service provided in hospitals.

As a general rule, both the hospital and the medical service plans have been most successful in cities and among industrial groups who could be enrolled in groups or in considerable numbers, and where a payroll check-off could be used to simplify the collection of premiums. While the successes attained, especially by the hospital service plans, are rather impressive, it is difficult to believe that these plans can of themselves expand into comprehensive medical care schemes.

Though little has yet been done to assure ready access of the people to needed medical services in the United States, there has developed a system of tax-supported and publicly administered community health service. This service embraces sanitation, vital records, communicable disease control, maternal and child hygiene, and specialized programs dealing with tuberculosis, venereal disease, cancer, and mental hygiene. The main object of these public health services is prevention rather than cure. The services operate within the framework of government, and in administration they generally follow the political subdivision of the country.

VOLUNTARY HEALTH INSURANCE FOR RURAL AREAS

The actual experience of the Farm Security Administration of the United States Department of Agriculture, largely confirms the failure of a wholly voluntary program of health insurance to provide comprehensive services to all sections of the population, especially the rural population.

In the course of about seven years, group prepayment (insurance) plans for medical services were organized in nearly 1,200 out of approximately 3,000 counties in the United States. Each plan was quite small, having on the average only about 100 to 200 families. These were practically all low-income farm people. In the American tradition of private medical practice, professional groups were, in general, willing to undertake agreements on an organized prepayment basis only with low-income families.

The physicians, dentists, hospitals, or druggists were paid for their services, generally on a fee-for-service basis, with the bills being prorated in proportion to the actual funds available. Thus, if \$1,000 were available for payment in a given month and \$2,000 worth of bills were submitted, then each bill could be paid to only 50 per cent of its value. In about 15 per cent of the plans, however, the per capita method of paying for services is used (a fixed fee for each person during a specified period of time regardless of the services rendered). In a few of the plans for dental services, payment to dentists is made on the basis of a per-

hour salary. Throughout the country, about 70 per cent of total charges on bills submitted are paid—a far better income than previously derived by the same practitioners from this income group in the population.

The average cost of membership in these plans ranged from about \$20 to \$50 a year per family, depending on the completeness of the services. This money was most often loaned to the family for membership in the health association by the Federal Government, to be paid back to the Government within five years. Of all “borrowers” from the FSA, who represent the persons eligible for membership in these plans, only about 50 to 60 per cent decided to join on a voluntary basis. Had loans not been forthcoming for easing the burden of paying membership fees, it is impossible to say how many farm families would have joined these plans, but—no doubt—it would have been much smaller.

For one section of the farm population who were too poor to pay for prepayment plan membership even on a loan basis, special health services were organized, with the cost being borne completely out of Federal tax funds. This was the migratory farm labor population who represent in this country mostly small farmers, sharecroppers, or tenants who have been forced off the land into seasonal farm work for wages. For this group of farm people, a network of camps was set up, in each of which there was a health clinic under the direction of a full-time registered nurse. Local physicians would attend these clinics at appointed hours each week and would be paid on a per-hour salary basis.

In order to help reduce the incidence of filth-borne diseases, the FSA made several thousand grants to low-income farm families to help them construct essential facilities for environment sanitation. Through this program, tens of thousands of farm homes were provided with sanitary privies, proper wells, and complete screening for their homes.

Many lessons have been learned from this experience. It can be definitely stated that the application of the insurance principle to medical service has resulted in the provision of a greater volume of services than would have been the case otherwise, and physicians and other professions have been paid more satisfactorily for their work. The people and the professional groups alike are, by and large, in favor of the arrangement and want to see it continued.

There have been other scattered experiences in health coöperatives in the United States outside of the FSA, but they have all been of more or less limited value. A coöperative hospital is operating in Oklahoma but the high initial cost of such an institution has probably accounted for the failure of this pattern to spread. The voluntary hospitalization insurance movement known as the “Blue Cross” program has been carried to a few rural areas chiefly through farm organizations.

Hospital costs amount to only about 15 per cent of the total cost burden of medical services in America. In a few states the Farm Bureau has provided its members with group cash indemnity insurance, under which a person sick for more than seven days, usually, is given a cash allotment out of which he may pay his medical bills.

A few large philanthropic organizations have sponsored programs of public health services or hospital construction in rural areas on a demonstration basis. The chief lesson of these programs is to show simply that with ample funds the widely scattered homes and lack of education and wealth among rural people can be overcome, and good services can be provided. The large public clinics available to recipients of public welfare in the cities are not available in the rural areas.

The outstanding lesson of American experience with rural health plans is the indication of the need for organized action at the national level if the rural needs are to be adequately met. Leaving the problem totally to the resources of local groups, acting on a voluntary basis, results in little in the way of actual accomplishments. The rural areas are economically the poorest, and they must receive assistance from the wealthier urban areas.

An adequate rural health program, therefore, probably calls for combined national, state and local action which would include farm people in a program covering health services as well as old age and disability benefits, maternity benefits, and other human needs.

SUGGESTIONS FOR YUGOSLAVIA

The pattern of a health service must, if it is to be effective, be adapted to the nation, to its particular health needs, and to its people—with their own outlook on life, their background and their customs. Accordingly, the health experience of the United States has to be adapted rather than transplanted to Yugoslavia. The following steps are suggested for Yugoslavia's health program. While based upon experience in the United States and many other countries—these outlines attempt to take account of the special conditions and needs of Yugoslavia.

Objectives

The general aim of the program is adequate health service for all the people of Yugoslavia, including preventive, diagnostic and curative care, with special emphasis on prevention through both community and individual services as needed. The method of financing the program should be such that it utilizes the resources of the nation as a whole as well as of each locality, so that health services shall not be lacking in any commu-

nity by reason of its relatively limited wealth. The program must be conceived as one which is national in scope, but its operations should be—to the maximum degree that is practical—decentralized and local.

Organization

A single national health agency should have nation-wide responsibility for the health program. It should be charged with the duties of developing the details of the national health program and administering its nationwide elements. These duties should include: development of personnel for health administration and health services; educational institutes and training facilities, making arrangements—if necessary—to borrow health experts from international health agencies; administration of quarantine and inspection; public health education; standards for local services, including the actual operation of such services in the capital city and area; stimulation of the development of local public health agencies, centers and services.

Finances

National resources should participate, perhaps to the extent of one-half the total, in the financing of all health services and local financial resources (community and individual) should make up the other half. Perhaps only through arrangements of this general kind, can the general objectives be met. Investment in the health of the people is an investment in the nation itself, and it is an investment which is necessary for the progress as well as rehabilitation.

SUGGESTIONS FOR THE STRENGTHENING OF THE COOPERATIVE MOVEMENT

THE Coöperative movement made great world-wide progress in the interval between the two World Wars. The celebration of the 100th anniversary of the Rochdale movement in 1944 served to bring attention to the history and growth of this form of community mutual activity. Community coöperation in some form has existed for many centuries and the history of such efforts in Yugoslavia is probably as old as the civilization of that region. During the last quarter century, however, new structural organization and operational efficiency has been developed and the scope and membership of the organization have been widely extended.

World-wide organization to promote “coöperation between coöperatives” of the several nations, begun in 1896, has grown until about 60

nations are now recognized as having made distinct progress in this field. The international organizations of the last century include many that have striven to help the coöperative movement. Outstanding among these have been the International Coöperative Alliance, International Institute of Agriculture, the Horace Plunkett Foundation, League of Nations and others. In 1944 the International Coöperative Reconstruction Conference was held at Washington to prepare for better worldwide collaboration among coöperatives, and made plans for further international advancement.

The United Nations Food and Agriculture Organization is designed to serve the coöperative movement in certain ways which, if plans are carried out, will bring help to coöperatives in those countries devastated by the war. Altogether these evidences of progress point toward a period when self-help by communities and groups may have a larger part in the economic development of many countries.

COÖPERATION VITAL TO YUGOSLAVIA

Yugoslavia is one of the countries where agricultural coöperation has and likely will continue to play an important part in the economic life of the people. The movement was making especially rapid progress in all parts of the country from the unification in December 1918 until the occupation of the country by her enemies in 1941. The history and traditions of the coöperative effort of the people of Yugoslavia has been given in Chapter I and need not be repeated here, except to mention the outstanding trends. Growth in numbers of organizations and membership has been steady and rapid. Not only did the number of associations more than treble from 1920 to 1938 but the total membership increased at a still more rapid rate, from 456,175 in 1925 to 1,414,876 in 1938. As early as 1933 the coöperatives in Yugoslavia were said to be serving about 34 per cent of the total population.

The larger number of the coöperatives were serving the farm people either as consumer, agricultural, or credit coöperative associations or societies. They have been classed as follows for 1938:

<i>Type</i>	<i>Number</i>
Consumers'	2,530
Credit	4,912
Worker's production and labor	159
Housing	124
Agricultural	1,920
Other	1,187
Total	10,833

AGRICULTURE DETERMINES TYPE NEEDED

As a first step in looking forward to building better agricultural coöperation, the type of agriculture in a country, area, or community should be given careful consideration. The program must be made to fit the individual situation. Farming in Yugoslavia is not organized along commercial lines for cash income, but is a way of life—to furnish the means of livelihood to the farmer and his family. The production of enough to eat, drink, and to wear, and to pay interest and taxes, is by necessity the aim of the majority in the farm occupation. The production of marketable surpluses is incidental to the satisfaction of the requirements of the household.

The relative low yield of field crops has been attributed to: (1) Poor seed; (2) poor and shallow farming with inadequate cultivation of some crops after seeding; (3) a general lack of fertilizers; (4) insufficient crop rotation; and (5) primitive cultural methods and lack of machinery. Most of these factors might be improved at least in part, even if very slowly, through coöperative effort. The small surpluses of products available on the small farms for marketing naturally did not create a demand for coöperative marketing on a commodity basis, such as has developed in the United States. Due to the topography of the country and to the reliance on waterways as the chief means of transportation, surplus products from any area tend to move to the market most easily accessible. This lack of free choice of markets has been a handicap to agriculture.

The problems facing the coöperatives of Yugoslavia, then, are those of restoring their activities to meet the emergency and at the same time to shape their plans so as to best meet the requirements of the next decade. The devastation of war has impoverished the people so that the first need is for funds with which to resume activities.

CREDIT A FIRST NEED

Nearly half of the 10,832 Yugoslavian coöperatives in 1938 were credit coöperatives—indicative of the need for credit. Interest rates in the past have often been exorbitant and the outside credit agencies have in some instances used their credit to control and to exploit agriculture and industry. An adequate credit set-up for agriculture is needed to make production, farm improvement, marketing and other loans. Cooperatives may have difficulty in developing if the members do not have some control of their credit facilities because outside credit agencies usually seek to control the organizations that use their money.

The form of the financial organization that is needed to make funds available will depend to a large degree upon the general reconstruction finance set-up of the nation. Grants will be necessary at first from national or international sources, until the coöperatives can assemble assets to begin to operate alone. This problem calls for the best efforts of the national leaders of the coöperative movement and the details cannot be laid down by any one not in close touch with the national financial situation. One suggested approach is outlined in Chapter II.

NATIONAL ORGANIZATION ESSENTIAL

It is assumed that the general organizational plan for coöperative development, as contemplated under the Coöperative Law of 1937 of Yugoslavia, will be resumed after the war. This plan, it will be recalled, has three categories or levels of coöperative organizations, the local or primary, the union or secondary, and the national or tertiary. All locals were compelled to be members of the secondary form, which have been called the coöperative unions. Since these unions are, in geographic scope, similar to the regional organizations in the United States, they are here for clarity referred to as regional associations. All of these regional associations had to be affiliated with the national organization, the General Federation of Coöperative Unions, with headquarters in Belgrade.

The need for a strong national organization is important because of the necessity for coöperatives to protect their special status as non-profit organizations to which tax-exemption has been granted by most governments. They must be represented in national activities by this central agency to maintain their place in the development of national policies. This is not a political activity but a representation of a group interest.

While the Yugoslav coöperatives in the past have had the sanction of the government, they have not been financially supported or actively helped by it. So, it may be said that in the past, the coöperative movement in Yugoslavia has developed without state aid.

SERVICE AND RESEARCH ARE NECESSARY

The creation of a Coöperative Research and Service Agency becomes a necessity at the very beginning. This agency might serve the agricultural coöperatives only or it might be an overall agency serving all forms and types of coöperatives. The functions of this agency would be to

conduct research studies and service activities relating to problems of management, organization, policies, merchandising, sales, costs, competition, and membership, arising in connection with the coöperative marketing of agricultural products and with the coöperative purchasing of farm supplies and services. It should publish the result of such studies, to confer and to advise with officials of farmers' coöperative associations; and to coöperate with educational agencies, coöperative associations and others in the dissemination of information relating to coöperative principles and practices.

It is suggested that, except in the specialized crop sections, general all-purpose, local associations be encouraged in Yugoslavia instead of specialized or commodity coöperatives. This is believed to be advisable because the land holdings are small and farming is for the most part on a self-sufficient basis. The peasant farmer has little of any one product to sell and has only small purchases. It is for this type of farmer that the multi-service association should be encouraged. Where the farms are specialized and are large-scale producers of certain products such as grain, wool, livestock, or eggs, commodity or specialized coöperatives might be advisable. Justification for specialized coöperatives exists in Yugoslavia where there is concentrated production of grain, livestock, and fruit.

An important point to keep in mind is that the coöperative movement can and should have educational and cultural influences, besides economic influence. The local coöperative society might well become the center of all community activities (economic, recreational, cultural, and educational) like it is in Ireland and was before the war in Yugoslavia. The fact that the majority of Yugoslavia's farmers live in villages instead of on individual farms makes this type of local coöperative doubly preferable to the specialized and commodity type of association, which has predominated in the United States.

This general organizational plan for the agricultural coöperatives of Yugoslavia suggests the advantages of a federation of local coöperatives rather than to encourage the growth of large coöperatives of the centralized type with local branches. The federated type of association, based upon local coöperatives with local autonomy, would be more democratic and therefore more preferable and acceptable to the Yugoslavs than a system composed essentially of large associations of the centralized type.

Associations of the centralized type are by their nature more remote from individual farmers than are local associations. If, however, there is no assurance that federation of the locals and unions will take place,

strong coöperatives of the centralized type would be more effective. In any instance, it should be realized that no type should be contemplated to the exclusion of the other. The type may and probably should depend upon the local situation. In some instances small or regional associations of the centralized type might be preferable; in others local associations joined together into federations. For processing or marketing certain commodities or other special purposes, in areas which are not or will not be covered by locals, the locals might expand their operations by establishing branches and thus in effect becoming associations of the centralized type. This should not, however, prevent their affiliating with other associations at the higher level.

In the community coöperative suggested there would of necessity be much local variation in the set-up, in the commodities handled, and in the services rendered. The guiding agency would be particularly helpful in determining the needs of each community. Besides the horizontal, multi-commodity, integrated set-up suggested there should be complete services for each commodity handled by the local on a vertical integrated basis. This would mean a complete service for all of the important products raised and processed in each community. In the regional and national organization separate commodity divisions or departments would probably be necessary.

In the case of poultry, for example, this would mean making available all services needed by the farmers in producing and in marketing their eggs and poultry. This would call for services all the way from procuring the desired baby chicks or hatching eggs to the marketing of the excess products. It would mean the giving of advice relative to poultry housing, feeding, care of bird, eggs, disease, marketing, etc. In short, it would coöperate to enable the producers to keep unit production costs down, to secure the maximum production, and to obtain the highest net price. Such a program would include standardization of the products to facilitate marketing.

Especially for products to be exported, national brands or trade-marks might be adopted to the advantage of Yugoslavian farmers. The Government should require that minimum quality standards be met before the national brand could be used. The same overall brand might be used for all agricultural products to be exported from Yugoslavia or each product might have a separate and distinctive brand on a nationwide basis. Such a brand or brands should not be used until sufficient dependable sources and quantities of the desired quality can be obtained and until there is available adequate inspection and supervision to assure, for the reputation of the products, that the quality is uniform and of the grade

indicated. The system of coöperatives suggested in this chapter could do much to inaugurate and to implement a quality production and marketing program for export purposes in particular.

In any plan on a national basis for a system of farm coöperatives, changes should be anticipated and provision made to meet them. It must be realized that all coöperative systems need considerable revamping from time to time. Considerable change will undoubtedly take place in Yugoslavia during the next ten years.

While a general pattern may seem advisable the widely different areas, customs, transportation facilities, markets, and other factors will of themselves call for departures from any standardized set-up. These departures are desirable provided there is no resulting loss of efficiency or lack of coördination of effort among the coöperative groups. There should be a flexibility which would permit changes, adjustments and variations. The probable later developments, evolution, and progress cannot be foreseen nor anticipated because of unknown local, national, or even international situations or developments which might have a direct or indirect effect.

A NATIONAL AGRICULTURAL POLICY IS NEEDED

The inauguration of a program of land reform and soil conservation to give more stability and greater efficiency to agricultural production and more permanence to tenure of the newly parceled land than existed after the First World War is basic to the success of the agricultural coöperatives.

This is of importance to the coöperative movement because agricultural coöperation is likely to be most successful where land tenure is on a satisfactory and permanent basis and where land fertility and other production factors give the farmers an opportunity to improve their standard of living. As long as agriculture remains backward and the farmer continues to lack economic independence, coöperative associations are likely to make limited progress.

Authorities on Yugoslav agriculture agree that private ownership and operation of family size farms are jealously guarded rights and a well-established tradition. It is assumed, therefore, that the individual and family ownership and operation of land will continue, that in time the few large estates created by the Turks, Austrians and Hungarians which escaped partition at the conclusion of the First World War will be broken up and redistributed, and that there will be a consolidation of the small and scattered fields into more efficient farms. The leaders in coöperation

should have a part in the development of the new national farm policy to keep it close to their practical needs.

A revived national program for coöperative development is the general objective of the foregoing suggestions. The program should be built upon plans and foundations laid prior to 1941 but made more active, definite, and helpful. The 10,000 or more coöperatives existing in 1938 should be revived as soon as possible, broadened out to cover more people and activities. Other coöperatives should be established, and all tied into a national coöperative system of locals, regionals, and the national association.

This national coöperative set-up might well include the consumer and industrial coöperatives. It is assumed that coöperative effort will be encouraged by the government after the war. It is even conceivable, since the spirit of coöperative is instinctive in the nation, that membership in coöperatives might be made the universal policy of the nation.

CHAPTER IV

A System of Agricultural Education and Research after an American Model

A WELL DEVELOPED educational program is the first step toward the permanent improvement of agriculture as well as for all other national advancement. This should provide for the education of the masses of the people on the land and in their homes as well as for those who are able to make more advanced studies to fit themselves for the duties of teaching and leadership. While the training of leaders is a first essential, progress will be very slow if the more popular and practical instruction is not extended promptly to large numbers of the people. The two approaches go hand in hand.

The vital importance of agriculture in the total economy of the nation and the necessity for developing the agricultural industry on the soundest principles possible, justifies special consideration on the part of national government. This fact was recognized fully in the United States over 80 years ago when the Congress of the United States made special grants to the state agricultural colleges. These grants were later supplemented by special appropriations to carry on scientific research and to conduct educational work with farm people on their farms. The following suggestions for strengthening the facilities for agricultural education in Yugoslavia are based largely on the experience gained and the progress made in improving agriculture in the United States through these three educational efforts.

HIGHER SCIENTIFIC TRAINING

Universities must provide, in addition to the general basic educational work, special courses in agriculture such as Agronomy, Animal Husbandry, Dairying, Horticulture, Poultry, Soil Conservation, Marketing and the like. The degree of specialization in a particular university would necessarily depend upon the total resources available to the institution and the agricultural area which it serves. Each such institution, to the extent practicable, should provide course work in the various fields of scientific agriculture to insure that the graduates from these institutions will be well equipped as practical agriculture leaders and teachers.

American experience has shown the advantages of providing for adequate research facilities and personnel to carry on research and experimental work in close association with the university work. The research personnel in a particular field of agriculture should be attached to the specific department of the university or college responsible for work in that field. For instance, research personnel working in the field of developing new and more productive varieties of field crops would be responsible to the Department of Agronomy; research workers in the field of animal breeding, feeding, management and the like would be responsible to the Department of Animal Husbandry.

COORDINATION OF TEACHING AND RESEARCH

In order to keep the research activities of these departments closely associated with the needs of farmers, as well as to insure that the research findings of value are relayed to farmers in a way they can understand, each department should have persons to serve as a liaison between the research program and farmers. These extension specialists should be versed in the scientific findings as well as in the practical problems which farmers face. They should also be proficient in the techniques of carrying on educational programs of an effective nature with farm people. At the same time these extension specialists should be equally responsible for carrying the practical problems and difficulties faced by producers, agents and farmers' coöperatives back to the university for its consideration and necessary research.

There are many instances where a particular problem facing farmers will require coördination of efforts of two or more departments to determine practical answers and their relaying to farmers in an effective way. Such coördination of efforts into an overall program of research and extension work will help to insure that "first things come first." It is desirable, therefore, to have in each university an official to give over-all direction to the total research program in scientific agriculture and an official to be responsible for the coördination of all phases of the educational program to be carried on with farm people on their farms, in their homes, and through their coöperatives.

Experience in the United States has proven the advantages of direction by the National Government in the use of the funds contributed by it through agreements with each university on the particular lines of research or extension work to be carried on through the use of the national funds. By this means coördination is developed in the work done by the various universities in the field of agriculture thus eliminating

much duplication of effort, particularly in the research field. At the same time this procedure insures a free exchange of scientific information as between the various colleges, universities, and the national Department of Agriculture and, therefore, maximum returns from the funds expended.

EXTENSION OF EDUCATION TO FARMERS

The mass of farm people of any nation do not have the opportunity to attend universities. The knowledge developed at such institutions must be gotten to farm people in a manner which they can use if agriculture is to progress rapidly.

In America this purpose is accomplished by the system of county agents, at least one in each county, who work closely with the national Department of Agriculture and universities. These agents, to be effective, must be professionally trained with a knowledge of scientific agriculture as well as the practical problems facing the farmers of their counties. Their functions are those of teachers, organizers, and demonstrators.

These agents are available to render advisory assistance to all farm people and their coöperatives. In turn, they have free access to the services of extension specialists from the universities who could help them out on technical problems in agriculture concerning which research information is available.

These agents concentrate on bringing to all farmers the latest scientific information on improved crop and livestock production practices, marketing, conservation and use of the land. In addition they serve as the local representative of the Department of Agriculture and the universities in introducing to farmers new and improved varieties of crops and improved strains of breeding animals. In the less strictly agricultural field and more general educational and general welfare field these agents should assist farmers in developing desirable local farmer coöperatives, conduct educational work relative to the various fields of coöperation, and relative to health, sanitation, and nutrition and other such problems of importance to farmers generally.

EDUCATIONAL METHODS WITH ADULT FARMERS

Some of the most effective educational methods, as proven by experience in the United States are:

1. Demonstrations of improved practices and production methods on selected demonstration farms in the area.

2. Meetings of farmers in the various local communities where a small group of farmers can be brought together.
3. Visits to individual farmers on their farms to show them how they can make improvements in their farming methods.
4. Assistance to individual farmers in adopting a new farming practice for the first time.
5. Local fairs or shows where improved agricultural commodities produced by individual farmers can be shown in competition with those produced by other farmers for special recognition.
6. Distribution of simple short bulletins telling how to perform certain new farming practices of benefit to agriculture.

One of the most effective techniques in conducting educational work with farmers is that of the "demonstration." Farmers of the local area are advised of the demonstration and may be called together to observe the new method when it is started and again at the end of the crop season when the results can be shown. The demonstration field should be conveniently located so that it is available for inspection throughout the growing season. It is an axiom of education that "seeing is believing." Farmers are often skeptical of the value of a new practice or new crop when merely told about it, but when they see the value demonstrated in actual use, and in comparison with the old, they are willing to adopt it. Local meetings of farmers with the agricultural agent to consider the best ways of carrying on certain farming operations and the like are extremely valuable as a means of carrying education to busy farmers.

YOUTH EDUCATION IN AGRICULTURE

Although young boys and girls are not themselves operating farms as managers they help with farming operations and learn by doing. When farm youth learn to carry on an agricultural operation the better way they automatically follow that method when they begin farming for themselves.

Experience in the United States in agricultural extension work with farm youth in boys and girls clubs conclusively proves that not only do the youth themselves benefit from this work and learn to farm the better way, but also the boys and girls frequently influence their parents to adopt better farming practices when the parents could not be encouraged to do so through the educational work developed specifically for adults.

An example of what can be done to interest a small group of rural youth in adopting an improved agricultural practice is in improving poultry production. To do this a group of farm boys and girls in a local

area are informally organized into a local club. The activities are raising the chicks, from eggs obtained from a high-producing flock, according to the best feeding and management practices as provided by the agent. The agent also is responsible for locating and obtaining for the club members setting eggs of the desired quality. Meetings of the club members are held at which time each individual reports on his or her experience to date and problems being encountered.

At the end of the season each club member makes a final report on his experience and participates in a club "show" where the chickens raised were exhibited and compared and special recognition given to the club member or members obtaining the best results. This same group is lead into a more advanced activity the second year through enrolling in a project where the best pullets produced were kept for a small laying flock and managed and fed according to methods outlined by the agent. Eventually these same youth may take over the management of all the poultry on the home farm, utilizing the better fowls produced through club activities.

Similar activities on a small scale in other phases of farming are made the basis of group activities. For instance groups are enrolled to have as their individual projects the production of a small plot of potatoes using improved seed stock and cultural practices outlined by the agent. Other crop projects or livestock projects are made the basis of group activities according to the particular agricultural activities which seem locally most appropriate and of greatest interest to the local youth. Although both boys and girls can participate in club activities such as outlined above, farm girls alone are organized into club groups to carry on project work in better home making. Activities such as the making of clothing, home canning of food, preparation of meals and the like are effective means of developing a better understanding of successful home making.

The opportunity to compete with one another is a great stimulation to the youth involved. The participants learn by doing. When they become farmers or home makers in their own right they will continue the use of the improved methods learned and will constantly be on the alert for other new methods. Not the least important is the fact that group activities of this type provide an excellent means of developing an appreciation of the value of coöperation and good citizenship.

GUIDANCE BY LOCAL FARM PEOPLE

Experience in the United States has proven it is extremely important that the farm people in a county have some responsibility for assisting

with the local agricultural education program. They need to know that the program is theirs and they have some part in determining its content. To accomplish this objective local farmers provide a reasonable part of the necessary financing either through local taxation or voluntary contribution through their own organizations.

They also designate a small group of leading farmers as an advisory group to the agent in planning the work. As the work progresses more advanced farmers serve as local leaders and demonstrators on a voluntary basis in their local communities under the guidance of and in co-operation with the agent. Through this means many more farm people can be given guidance and assistance in a direct way than is possible where all such work has to be done by the agent himself.

AGRICULTURAL EDUCATION IN RURAL SCHOOLS

The fact that most farm youth will not have the advantage of formal education beyond high school, provision should be made for teaching the basic principles of practical and scientific agriculture in these schools. Departments of vocational agriculture should be established in the high schools for this purpose. The teachers in these departments should provide day courses in agriculture of such nature and scope that the students will derive practical benefit therefrom when they undertake farming operations for themselves.

American experience has shown the value of supervised farm practice work. This work serves to demonstrate in actual practice those principles of scientific agriculture taught in the day courses and might take the same general characteristics as the project work outlined above for youths in clubs.

Evening classes should be established only when the time and other duties of the county agent and the extension specialists from the colleges do not permit their meeting farmers' total needs through their demonstrations, meetings and other means of getting information to farmers.

The home project is an important part of vocational education in agriculture under the American system. All pupils are required to perform a set of practical operations at home or on a farm where they are assigned. The instructor supervises the work with the aid of the parents, whenever possible. Records of achievement are kept as a basis for grading the students' progress. The projects include a wide variety of subjects designed to cover the main practical operations in the principal lines of farming such as vegetable growing, field crops, poultry, dairying, swine, sheep, cattle, etc. In fact projects are outlined to fit the needs and

desires of the student to give him a broad view of the practical and scientific phases of the work that he is learning to do. The projects are frequently fitted into the home farm needs in a way to make the students work help in the family living program, for example, the care of the home vegetable garden, the poultry, pigs or sheep. It amounts to a supervised apprentice system under the guidance of the agricultural teacher. As a means of quickly extending better methods among young men who expect to become farmers it offers the outstanding method of approach, limited only by the availability of good teachers.

The "Four H Clubs" in the American system now number in the thousands and include over a million members. These youth groups are organized under the supervision of selected leaders in each community to carry on projects and to develop their individual abilities with respect to the subjects being studied in the schools and as a training in self-development and leadership. The "Future Farmers of America" is an organization of boys studying agriculture in the secondary schools to develop initiative and leadership in agriculture and general good citizenship. Over 6,700 local groups in 47 States included over 200,000 youths in 1944.

AGRICULTURAL RESEARCH

The restoration and expansion of research in agricultural problems is peculiarly dependent upon the ability of the directing staff. As those who have been identified with research in Yugoslavia are reassembled after the war a new plan of action must be worked out. This is not a matter of hasty action but should be developed only after careful study of the needs, resources and available personnel. In this phase of reconstruction the aid of scientists in other countries can be of the greatest value. While the war has set the research of the country back several years, the new work must be begun with full use of the progress that has been made in other countries during these war years. Yugoslavia need not begin where the work stopped but should make a new start abreast of current progress. This will involve selecting the best available men and women and sending them to countries where research has continued to be trained in the up-to-date processes. The arrangements for the exchange of students for graduate work under the U.N.R.R.A. will be most useful in this connection.

Suggestions at this time can only outline some of the most important lines of work that appear to be needed. These may be outlined as follows:

Nutrition and Food Technology
Animal and Plant Production
Soil Science
Animal and Plant Diseases
Rural Engineering
Industrial and Agricultural Chemistry
Animal and Plant Diseases and Pests
Fisheries and their By-products
Farm Economics and Management

Agricultural research is distinctly a world-wide coöperative effort in which the exchange of information between scientists promotes progress most rapidly. The plan for the United Nations Food and Agriculture Organization provides the most comprehensive and practical means of accomplishing this objective. When this agency comes into operation the best knowledge of all the world will be available to guide those nations that must rebuild their research work to meet the new situations brought about by the war.

CHAPTER V

The Future of Yugoslavia's Agricultural Economy

THE beginning of the late war found Yugoslavia with a large over-population of the land, low yields and inadequate food production even for the people on the land. On the other hand the country was at the same time exporting substantial amounts of farm products, principally raw grains from the larger farms of the valleys. Agriculture was the livelihood of three-fourths of the people who consumed four-fifths of what they produced and even then did not have enough. Consequently the struggle was the dual ones of, first, an effort to increase family subsistence and, second, to raise a small amount to exchange for industrial products necessary for the meager living of the majority of the people. Low income was not so much the result of an impoverished soil as of the crowded, small-holding system inherited from the past when the lack of freedom and opportunity to improve agricultural conditions was imposed by despotic foreigners.

During the period between the World Wars marked progress was made and the basis was laid upon which to build for the future. Not all of this experience has been lost and the reconstruction may well begin on foundations that are fairly secure. The problem of over-populated areas is not new and has been receiving intensive study by governments, economists and social leaders on a scale never before attempted. The last two decades have witnessed many and various attacks on the rural problems of Eastern Europe that furnish a large mass of experience that can now be drawn upon for guidance. The policies that have been followed in Czechoslovakia, Poland, Russia, Italy and also in the United States give promise that the problem of rural poverty may be solved by national adjustment combined with a new and just international trade policy. There is much more that points toward advancement than toward discouragement.

The age-old remedy of emigration offers less opportunity for a solution of over-population than it once did due to the widespread development of new lands throughout the world. Once there was the chance for surplus labor to be moved abroad into new and pioneer countries. The

growing industries provided a constantly increasing chance to find profitable employment. But the balance of labor supply has begun to be fixed by the barriers to immigration. The demand for unskilled labor has been checked by the development of machines and the supply is in excess of the requirements, even in the newer areas of development. Advancement must therefore come from an adjustment of agriculture to industry within certain areas. Self-sufficiency takes on a new economic character from the old one of merely providing for the ability to subsist in case of war and blockades. To meet this new situation calls for greater collaboration between nations to encourage trade, each producing the things it is best able to make with its natural resources for exchange for those essentials to better living that cannot be most economically produced at home.

FOREIGN TRADE IS SECONDARY BUT ESSENTIAL

Yugoslavia's problem is therefore the dual ones of producing more than is needed for domestic consumption, food and raw materials for better living, and at the same time developing her own industries to utilize the surplus labor of agriculture, and to turn out a larger surplus of more highly finished products to be exported. The attack on the two problems go hand-in-hand and complement each other. For example, the development of processing industries for agricultural products combined with better organized agencies to collect the small surplus of the many small farms would not only bring a larger return in the higher value of products for export but also provide the small farmers with the income needed to increase yields through better methods of production. While the suggestions in the foregoing pages are directed toward the purpose of better food production for the native people they also present the essentials for developing a commercial agriculture that will turn out an exportable surplus of larger volumes, higher quality and consequently higher price.

The Balkan countries and the Danube basin have been a source of food products, particularly grains and meat, for the more highly industrialized centers of Central Europe. Such progress as has been made in Yugoslavia has been advanced largely by the returns of this trade with Central and Western Europe. Now, and for some time to come, Central Europe may not be such a good market. It appears most likely that the better market will be in Western Europe which has been less devastated and will probably recover more quickly than Central Europe.

The general outlook for Yugoslav exports to the United States, despite

the rather long interruption to this trade as a result of the war, may be regarded as favorable. Many of the products which are normally exported from Yugoslavia are of a type for which the United States is largely dependent on imports, while a number of the other commodities include items for which a good demand has developed. As a result, Yugoslavia should experience little difficulty in attaining, and even exceeding, the prewar level of its sales in the United States, which averaged around \$6,000,000 annually, and represented about 5 per cent of its total exports.

The products which Yugoslavia has heretofore sold in the United States have, perhaps, the best future prospects of expansion. The outstanding item in this trade was crude copper, which accounted for between 50 and 60 per cent of total sales here and enjoyed a good demand because of its relatively high gold content. Based on value the leading exports from Yugoslavia to the United States in 1938, which may be considered a fairly normal year, were: Crude copper, hops, beans, crude opium, cheese, dried sugar beets, hides and skins, furs, pig leather, bone meal, chrome ore, medicinal plants, essential oils, glue, fruits and nuts and dried mushrooms. Such products as paprika, coriander, seed, sage and other spices, ferromanganese, and pyrethrum flowers, might become increasingly important as the major proportion of these was previously supplied by central European states and Far East countries.

An expansion in Yugoslav imports from the United States, on the other hand, is highly dependent on Yugoslavia's ability to increase its sales to this country. The volume of these imports has been governed largely by the level of exports to the United States, which provide the principal source of dollar exchange.

BEGINNING DOMESTIC INDUSTRIES

During this period of reconstruction of industrial Europe the task for Yugoslavia appears to be to give most of its attention to bringing its own production up to full domestic needs combined with the establishing of such industries as its means will justify together with all the aid that may be gotten from international financing. In this connection the United Nations proposed International Bank of Reconstruction and Developments, the Bretton Woods plan, offers a definite hope for better things to come. Yugoslavia has national assets that might well be pledged to get the capital with which to make the first steps. International investments for industries might be attracted to Yugoslavia by its government on sound policies of national finance because the country

has labor, minerals, timber and other raw materials for industrialization, in addition to great possibilities for the development of hydro-electric power. These possibilities are merely mentioned to carry the point that the future progress of Yugoslavia is dependent upon the coördinate growth of industry and agriculture. Better living for all the people means less employment in agriculture as the use of machinery increases and modern industrial and farm methods are adopted.

The food and farm products processing industries can be most quickly established and would likely have the most immediate beneficial effect upon the income of farmers as well as in expanding exports. Due to the abundance of labor Yugoslavia should be able to compete in foreign markets by low-cost production. The markets that she serves are so near that transportation costs can be held within limits. The establishment of many small industries to manufacture appliances for farm and home improvement offers opportunities for local coöperative activity. Many farm tools and machines suited to local needs can be made with local labor and materials at less cost than the imported articles.

Large scale mechanization of farms should be approached with caution until the problem of small holdings has been studied. While some land-reformers regard a wholesale reshuffling of small-holdings into larger units as the best remedy for the small-holding problem, there has as yet been no case where this method has been followed without great injustice and suffering among those small farmers who were disturbed. A slower, more gradual method of change would seem to be more in accord with the rights and freedom of the people. It may yet be demonstrated that through coöperative associations a better result could be obtained with less painful transition. Most governments that have forced such a wholesale change upon their people have done so with disastrous reactions. This problem is still world-wide—most acute in China, India and some other smaller areas. There are areas in the Danube valley, however, where the land holdings are well suited to power-farming and here the machine will prove its economy.

The family-size farm has come to be a recognized standard in America and in many older countries. This unit varies in size with the type of farming and soil productivity of different localities. It is a popular ideal because of its economic, social and political significance and has been closely associated with democratic institutions throughout history. Wherever men have become free, land-owning operators the progress of the nation has been most perpetual and improvement has been most rapid. New areas, developed primarily as sources of raw farm products for export, have been operated on the big-unit plan with little regard to

the family interest. It must be remembered that these areas began with small populations and as the population increased the size of the holdings shrank. Yugoslavs do not need to be reminded of the evils that arise from the landlords of broad areas under whom the serfs and peasants toiled and sweated for generations. Even today the partition of the big estates of Germany, Poland, Hungary and Spain is still a difficult task facing the post-war governments.

Looking ahead a decade, the future of Yugoslavia's agriculture appears more promising than that of many other parts of Eastern Europe. There are the three-fold needs to provide food for better nutrition for the large numbers of the people; to provide for the new demands that will come with the growth of industries, commerce and city populations; and also the constant demands of Europe as a whole for raw materials. This part of southeastern Europe has been forcibly retarded for a long period by various controlling restrictions partly from abroad, partly political from within, partly traditional and some social. Once full freedom of action is restored to the people there is no reason to doubt that in this nation of homeland-loving people leadership will arise to enable them to overcome many of the handicaps of the past centuries.

SUMMARY OF CONCLUSIONS

AGRICULTURAL reconstruction must proceed as a part of the general economic development of the nation as a whole. The primary objective is the increase of food production to assure an adequate and nutritious diet for all the people, both rural and urban. The secondary objective is to lay the foundation for a profitable agriculture that provides a surplus for exchange for the products of industrial workers.

Employment for the large proportion of the surplus labor may be provided by the development of the service industries so essential to produce the goods and services for the reconstruction and future development.

Community coöperation, the traditional spirit of the country, provides the basis upon which to build a system of self-help both for the emergency and for permanent improvement. The coöperative movement should be fostered and extended in every possible manner.

Education and research are basic essentials that must be planned and organized under governmental supervision with the maximum of native personnel familiar with local conditions and traditions.

The nature of the land problem suggests wise and cautious reforms, instituted only after the most careful economic surveys and experimen-

tation. Extensive schemes for changes in agricultural practices should not be begun until they have been thoroughly tested.

The national program for financing a period of reconstruction, following the emergency relief interim, would mobilize all national resources and stimulate and foster the interest of all the people in a wisely planned reconstruction movement.

A sound national trade policy with close and constant collaboration with nations offering a market for the products of agriculture is essential to assure an outlet for the increasing surpluses.

An adequately supported National Ministry of Agriculture, with State divisions, for each of the distinct regions of the country, organized to encourage the maximum of local leadership and initiative could be the directing agency for a plan for building a new national rural life and to keep agricultural development in accord with the general national economic progress.

The spirit of the traditional *zadruga*, "to work for your fellowman," is a key to the future in keeping with the spirit of the times and the new era of fellowship among nations that seems destined to arise during the second half of this century.

